Sampling Results for the Conditional Waiver for Irrigated Agriculture Monitoring Program – Central Valley Regional Water Quality Control Board

Quarterly Report – Activities from January 1, 2006 – March 31, 2006

Prepared for the Central Valley Regional Water Quality Control Board

By

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TABLE OF CONTENTS

BACKGROUND

The California Water Code (CWC) requires that any discharges, or proposed discharges, to surface waters that could affect water quality be described in a Report of Waste Discharge (ROWD). In the past, the Central Valley Regional Water Quality Control Board (CRWQCB) has regulated these waste discharges primarily through the issuance of Waste Discharge Requirements (WDRs) and National Pollutant Discharge Elimination System (NPDES) permits. NPDES permits are issued for point source and municipal storm water discharges, but irrigation return flows and storm water discharges from irrigated lands have been excluded from the program as a result of Resolution No. 82-036 "*Waiving Waste Discharge Requirements for Specific Types of Discharge*" which was adopted by the CRWQCB in 1982. This resolution exempted both irrigation return flows and storm water runoff from agricultural lands from permitting requirements. Due to insufficient resources, verification that dischargers were complying with the conditions of the waiver was not conducted and thus the 1982 waiver was largely a passive program.

In 1999, Senate Bill 390 changed the section of the California Water Code that authorized waivers of Waste Discharge Requirements specifying that all discharge waivers in place on January 1 2000 would end January 1 2003 if the Regional Board did not readopt them.

In November 2000, a lawsuit was filed against the CRWQCB by the San Francisco Baykeeper, the Deltakeeper and the California Public Interest Group to constrain the agricultural dischargers to obtain clean water permits and for the Regional Boards to use Waste Discharge Requirements to control discharges of pesticides from irrigated lands.

In July 2003, the Regional Board adopted Resolution R5-2003-0105. This resolution includes two Conditional Waivers, one for Coalition Groups that form on behalf of individual dischargers and the other for individual dischargers, to facilitate compliance with the California Water Code and the Plans and Policies of the Regional Boards. The Resolution R5-2003-0105 stipulates that the Coalition Groups must develop waste monitoring programs to assess the sources and impacts of waste in the discharges from irrigated lands and, if necessary, track progress in reducing the amount of waste discharge that affects the quality of the waters of the state and its beneficial uses. By January 2005 the local groups had to start their own monitoring programs. The goal of the two-year interim Waivers is to build capacity of local coalitions, engage with individual dischargers, and initiate data collection, all of which are aspects of the foundation for the long-term program (CRWQCB 2003).

INTRODUCTION

In conjunction with the resolution, the Regional Board executed an interagency agreement with UC Davis Aquatic Toxicology Laboratory in November 2002 to conduct an evaluation of water quality of agricultural drains throughout the Central Valley, which is considered Phase I of the program. The water was evaluated primarily through the use of aquatic species toxicity testing in a limited number of agricultural drains in the San Joaquin River and Sacramento River

watersheds. Phase II of the program was contracted to UC Davis Aquatic Ecosystem Analysis Laboratory and the California Department of Fish and Game (CDFG).

Phase II of the program includes the following objectives:

- Evaluation of water quality by using chemical analysis and toxicity testing in a number of agricultural drains in the Central Valley
- Identification of the causes (e.g. sediment, contaminants, salt, pesticides) of any water quality impairment
- Determination of the sources of contaminants based on the identified causes of impairments
- Use of the data and information gained in this program for recommending use of management practices and future assessment of agricultural runoff and drainage waters.

For Phase II, selected sites were sampled for chemical analysis, water and sediment toxicity during the storm season (December through February) and the irrigation season (March through September). The sampling occurred during the first 24 months of the Phase II program. The 2004 irrigation season occurred from July 8 – September 16, 2004. The 2005 Dormant season occurred January 26 – February 20, 2005. Sampling for the 2005 Irrigation season was June 13 – August 10, 2005. The 2006 Dormant season fell January 15 – March 1, 2006. The remainder of the third year will be used for data management and preparation of the final report.

The primary criteria for site selection are: (1) Drainage dominated by agricultural irrigation return flow (2) Land use patterns surrounding the site predominated by agricultural activities, and (3) Site is at a location near where the drainage water is discharged into a creek or river.

DESCRIPTION OF THE STUDY AREA AND THE SAMPLING PLAN

Eleven sampling sites were chosen for the Dormant Season 2005/2006 Monitoring Phase II Agricultural Waiver Program, these sites were located from Chico to the Westlands / Coalinga area (Table 1). The three sites designated with "FT" in their site IDs are the Westland sites (FT32, FT33, and FT34) and are referred to as such throughout the report.

Table 1. Dormant season 2005 / 2006 monitoring sites.
Site ID is used throughout the report to refer to specific sites

Site ID	Site Name	County	Latitude	Longitude
CS25	Jack Slough at Jack Slough Road	Yuba	39.18029	-121.57108
CS26	Butte Slough at Lower Pass Road	Sutter	39.19730	-121.90868
CS27	Colusa Basin Drain above Knights Landing	Yolo	38.81550	-121.77429
CS28	Colusa Basin Drain #5	Colusa	39.19563	-122.06090
CS30	Butte Creek at Gridley Road	Butte	39.36201	-121.89167
CS31	Main Drainage Canal at Colusa Highway	Butte	39.36214	-121.82305
CS32	Mud Creek at Sacramento Avenue	Butte	39.72904	-121.93191
CS33	Stony Creek at Highway 45	Glenn	39.71087	-122.00261
FT32	Fresno Slough at Huntsman Avenue	Fresno	36.58081	-120.20284
FT33	Cantua Creek at South Stanislaus Avenue	Fresno	36.42895	-120.33738
FT34	Los Gatos Creek at El Dorado Avenue	Fresno	36.16644	-120.20959

The goal of the sampling program was to collect storm water runoff during two storm events during the dormant spray season. Each storm was sampled for two consecutive days at each site provided flows remained elevated. All eleven sites were sampled once a day during each of the two storms. Table 2 provides the sampling frequency for each storm event.

DESCRIPTION OF STORM EVENTS AND STORM SAMPLING

Storm Event 1

The sites were divided among three sampling teams and storm sampling was initiated according to the rainfall patterns within broad geographic regions (Table 3, Figures 1-5). All weather information was gathered from www.nws.noaa.gov, www.weather.com, and www.weatherunderground.com. The first storm sampling occurred on January 15 and 16. During the first storm, only one of three Westlands sites (FT32) had enough water for a full sample to be collected, but this site was not sampled a second day. FT33 had only enough water to perform a pesticide screening (where only enough water for pesticide analyses are taken) and was not sampled on day two; FT34 was dry throughout the whole sampling event.

Table 2. Sampling frequencies of Ag Waiver Phase II Monitoring Sites

	STORM 1		STORM 2		
Site ID	**1/15/2006**	**1/16/2006**	**2/27/2006**	**2/28/2006**	**3/1/2006**
CS25	X	X	X	X	
CS26	X	X	X	X	
CS27	X	X	X	X	
CS28	X	X	X	X	
CS30	X	X	X	X	
CS31	X	X	X	X	
CS32	X	X	X	X	
CS33	X	X	X	X	
FT32*	X	//////////////////////		X	X
FT33*		//////////////////////		X	X
FT34*					

*Sampled on 2/28/2006 and 3/1/2006 for the second storm

X: denotes site was successfully sampled

///// Water levels too low to sample

Dry

Pesticide screening only

Table 3. Rainfall data (in inches) for the first storm event

	1/13/2006	1/14/2006	1/15/2006	1/16/2006
Chico (Oroville)	0.01	0.61	0.01	0.00
Colusa (Marysville)	0.00	0.37	0.00	0.00
Marysville	0.00	0.37	0.00	0.00
Meridian (Marysville)	0.00	0.37	0.00	0.00
Woodland (Sacramento)	0.00	0.49	0.00	0.00
Coalinga (Paso Robles)	0.01	0.14	0.04	0.00
Fresno	0.00	0.00	0.16	0.00

City in parentheses is where the rainfall data was taken from

Figure 1. Rainfall in Chico (as measured in Oroville)

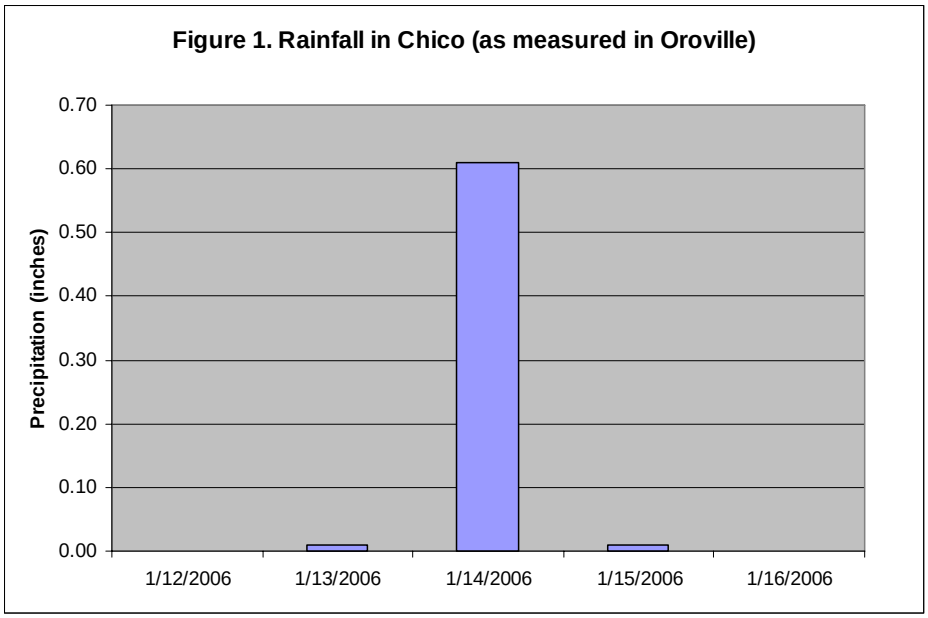


Figure 2. Rainfall in the Marysville area (Colusa, Meridian, and Marysville)

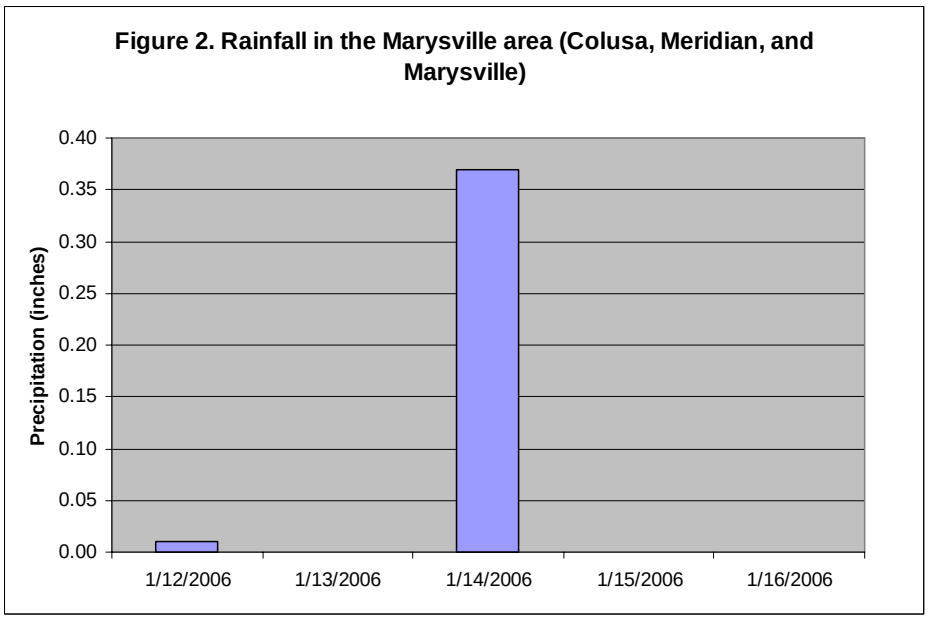


Figure 3. Rainfall in Woodland (as measured in Sacramento)

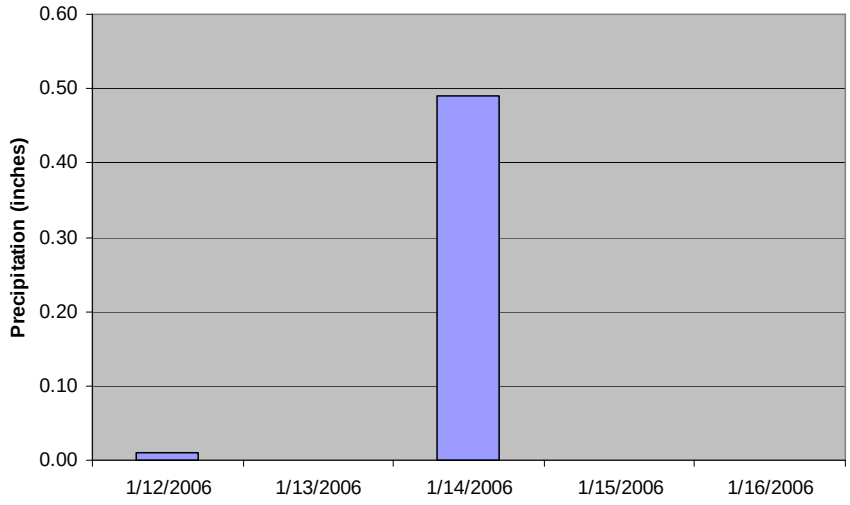


Figure 4. Rainfall in Coalinga (as measured in Paso Robles)

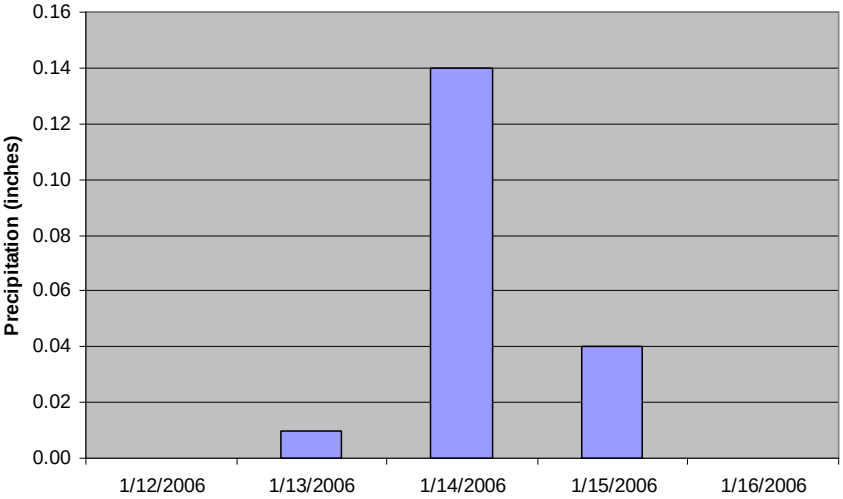
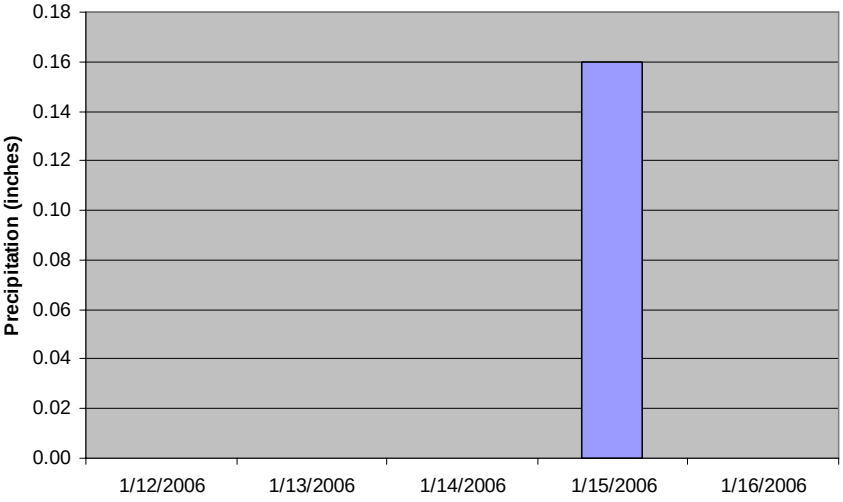


Figure 5. Rainfall for Fresno



Discharge was not measured during either storm event, although we were able to obtain river stage data from the CA Department of Water Resources (http://cdec.water.ca.gov/staInfo.html) for Butte Slough near Meridian (near CS26), Butte Creek near Gridley Road (CS30) and Cantua Creek (FT33). Figures 6, 7, and 8 show the water elevation for the three creeks for the first storm event.

Figure 6. Water Elevation at Butte Slough (near Meridian)

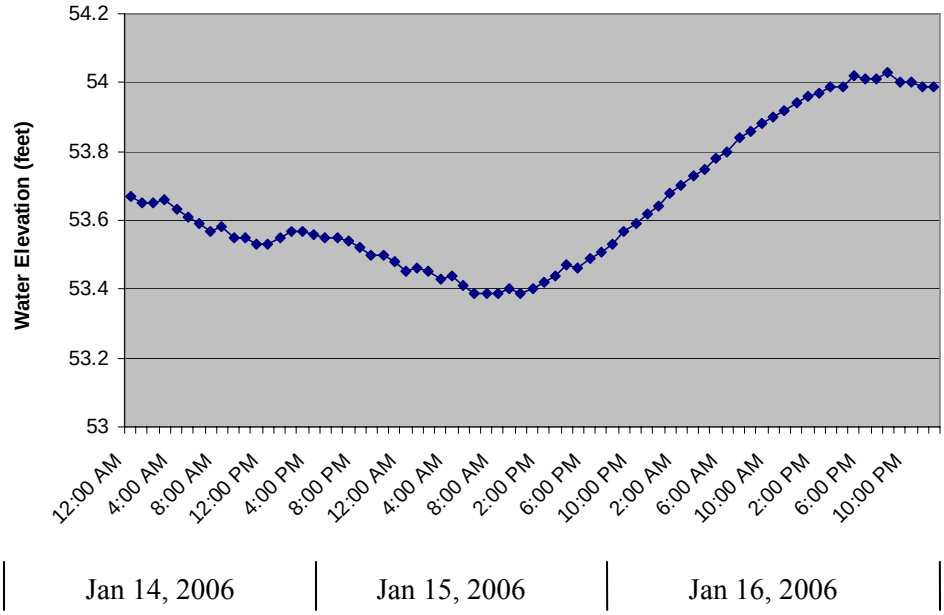


Figure 7. Water Elevation at Butte Creek (near Gridley Road)

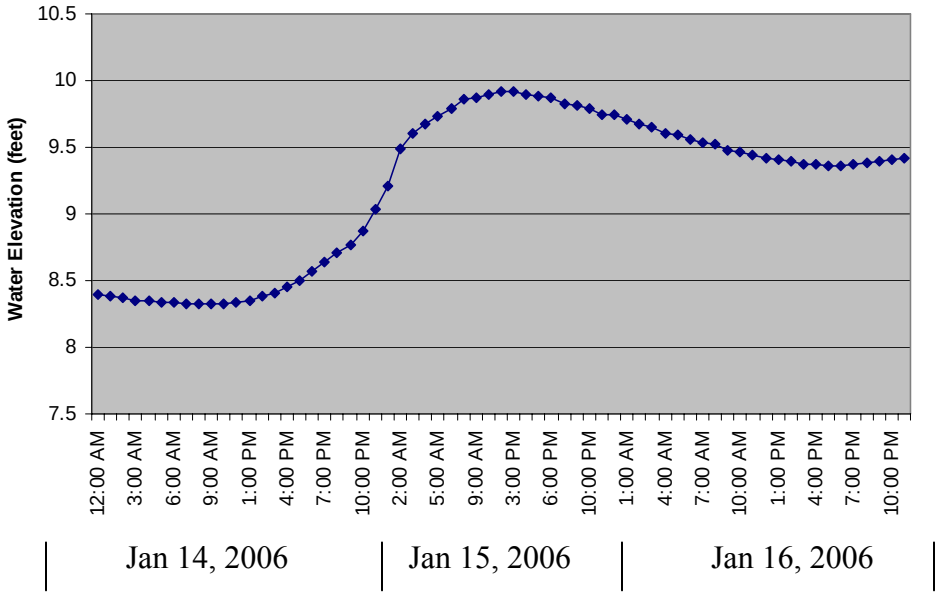
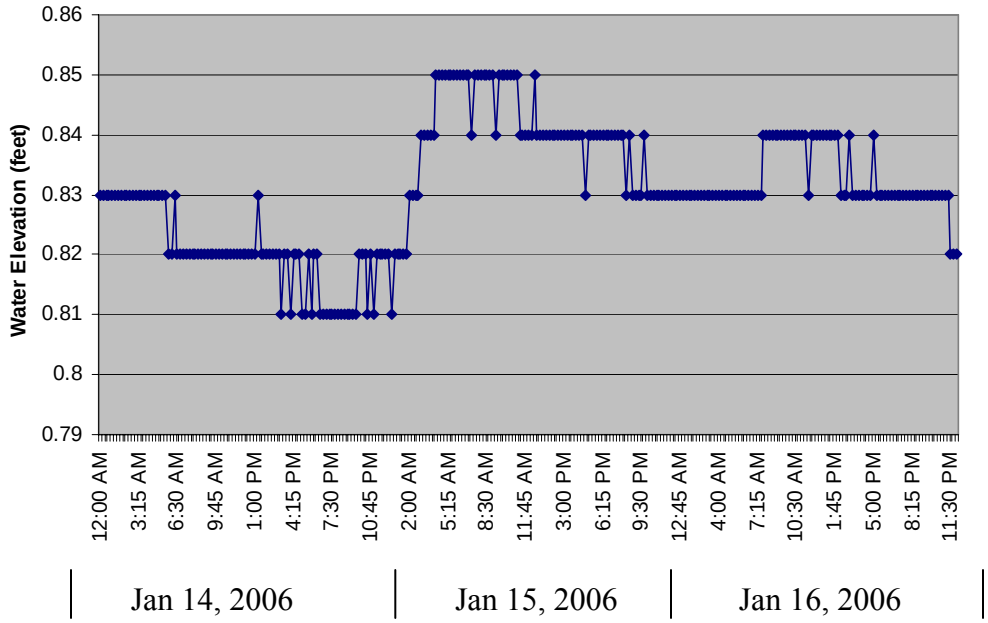


Figure 8. Water Elevation at Cantua Creek



Storm event 2

The second storm event was sampled February 28 – March 1, following a relatively dry month (Figures 9-13). Table 4 and Figures 9-13 provide the rainfall for the areas surrounding our sampling sites (rainfall given in inches). The northern sites (all site IDs designated with "CS") were sampled on February 27 and February 28. Sampling at the Westlands sites (FT32, FT33, and FT34) occurred on February 28 and March 1. Los Gatos Creek at El Dorado Avenue (FT34) was dry both days.

Table 4. Rainfall data (in inches) for the second storm event

	2/25/2006	2/26/2006	2/27/2006	2/28/2006
Chico (Oroville)	0.00	0.29	2.93	0.12
Colusa (Marysville)	0.00	0.25	1.53	0.01
Marysville	0.00	0.25	1.53	0.01
Meridian (Marysville)	0.00	0.25	1.53	0.01
Woodland (Sacramento)	0.00	0.35	1.09	0.01
Coalinga (Paso Robles)	0.00	0.01	0.22	0.09
Fresno	0.00	0.03	0.01	0.07

City in parentheses is where the rainfall data was taken from

Figure 9. Rainfall in Chico (as meaured in Oroville)

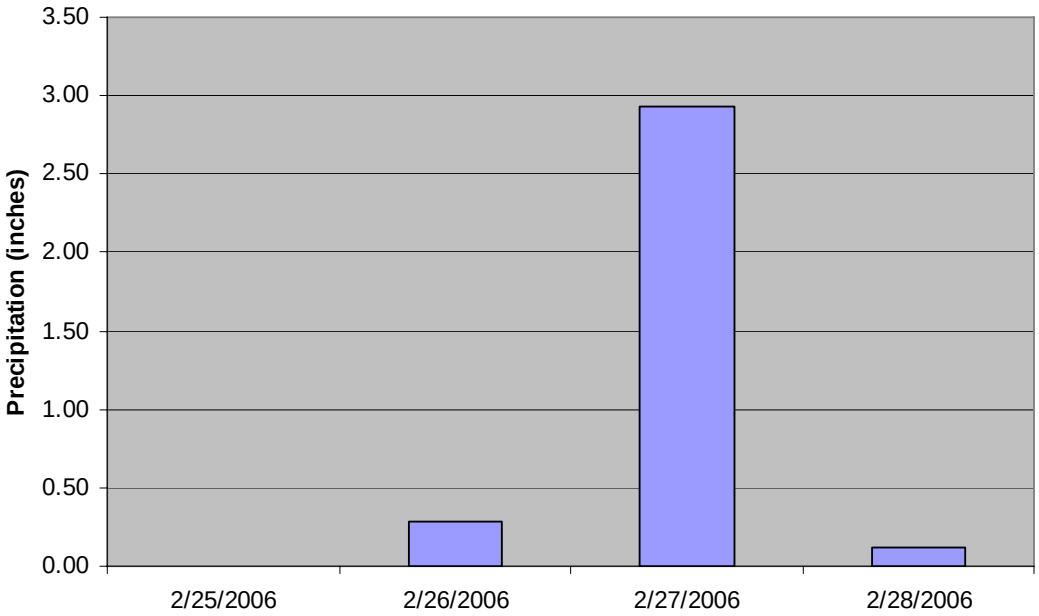


Figure 10. Rainfall in Marysville area (Colusa, Meridian, Marysville)

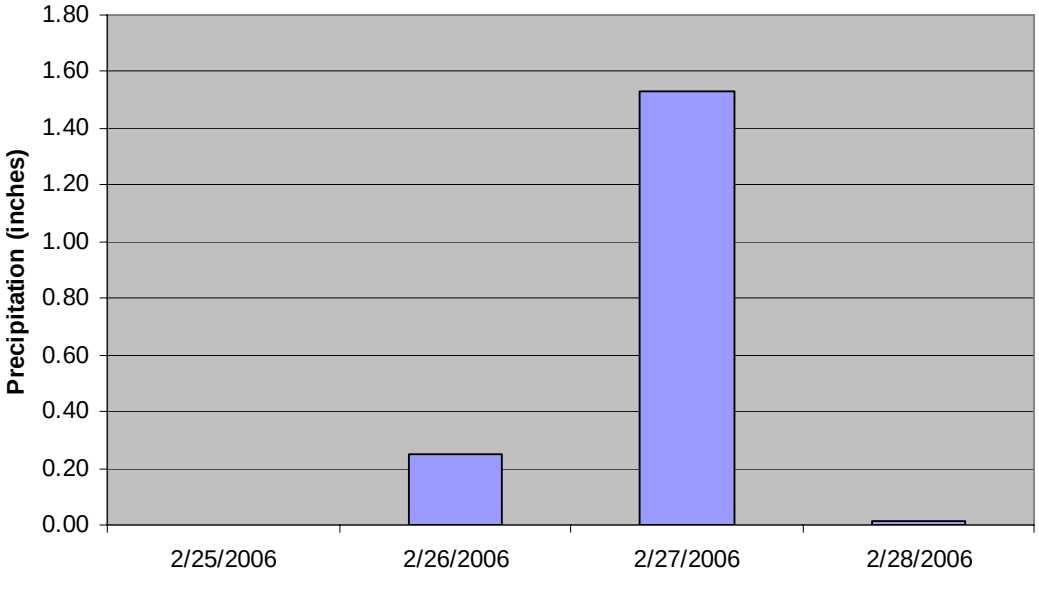


Figure 11. Rainfall in Woodland (as measured in Sacramento)

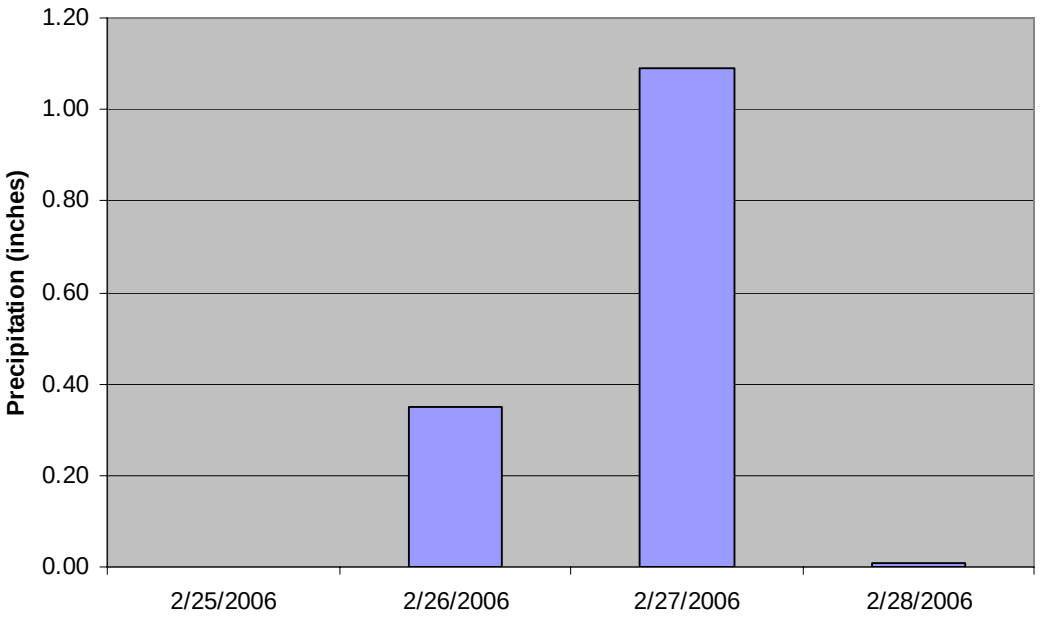
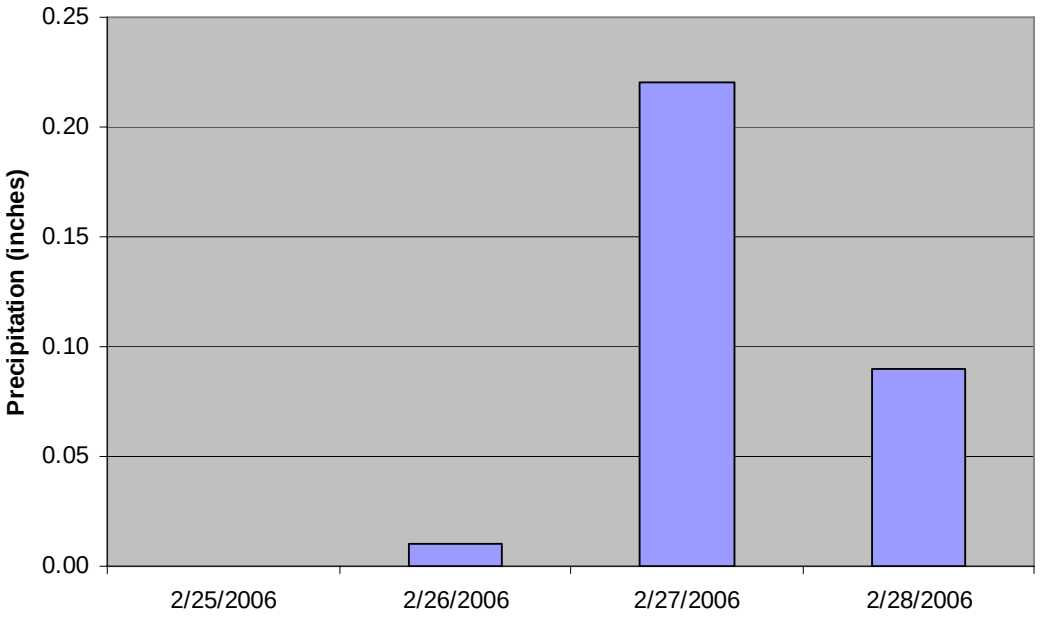
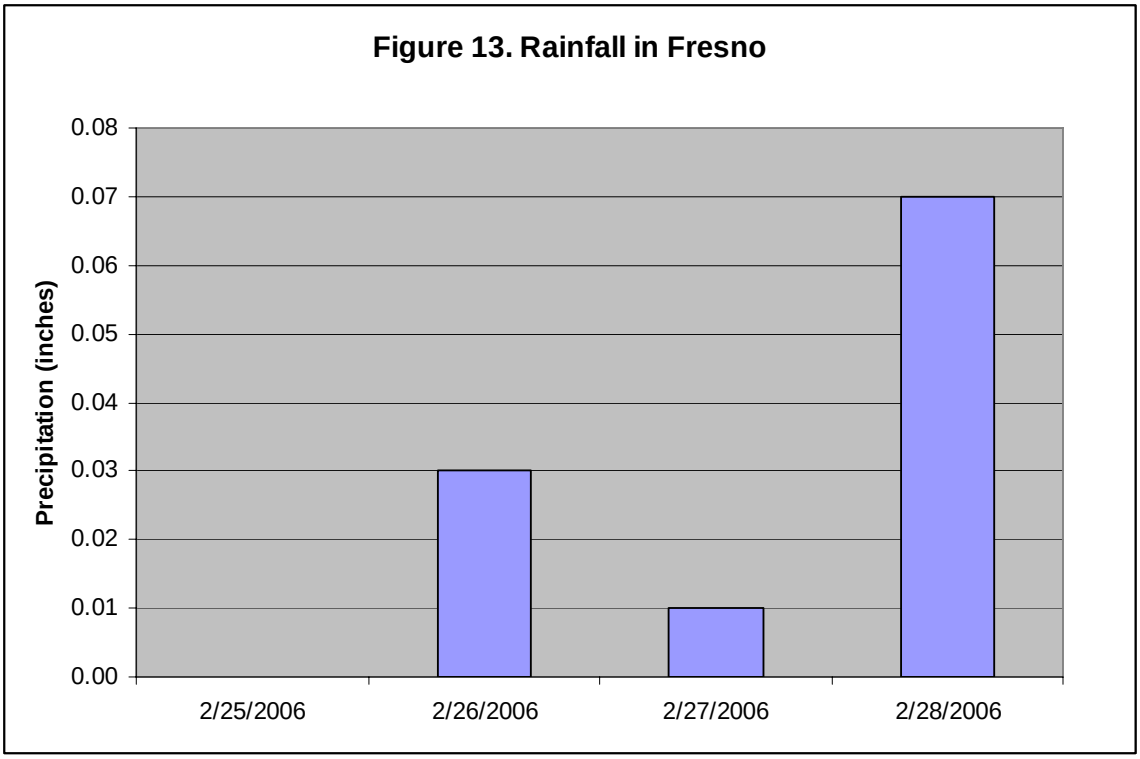


Figure 12. Rainfall in Coalinga (as measured in Paso Robles)





We obtained river stage data from the CA Department of Water Resources for Butte Creek near Gridley Road (CS30) and Cantua Creek (FT33), but there was insufficient data available for Butte Slough near Meridian (CS26). Figures 14 and 15 show the river stage for Butte Creek and Cantua Creek.

Figure 14. Water Elevation at Butte Creek near Gridley Road

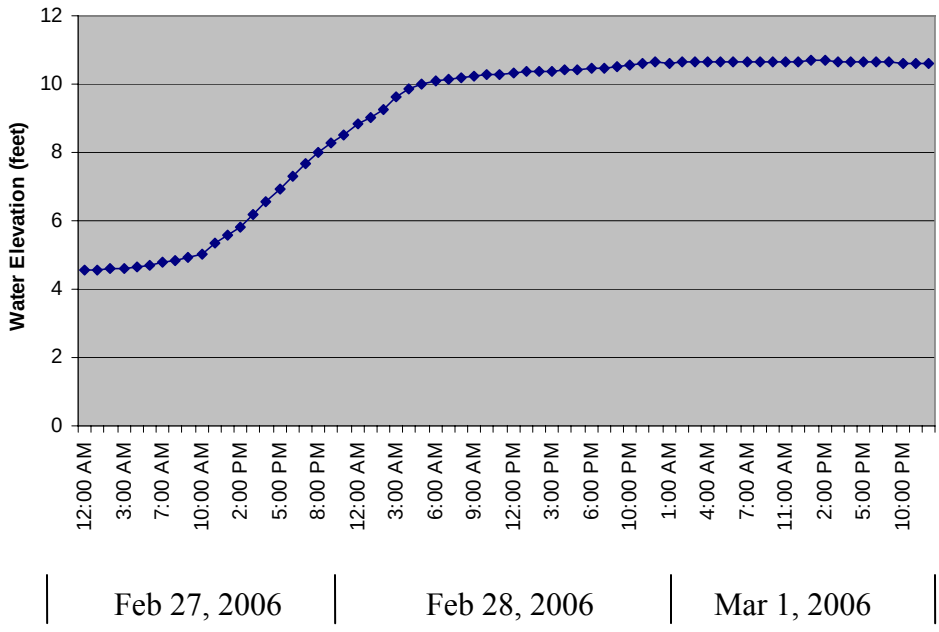
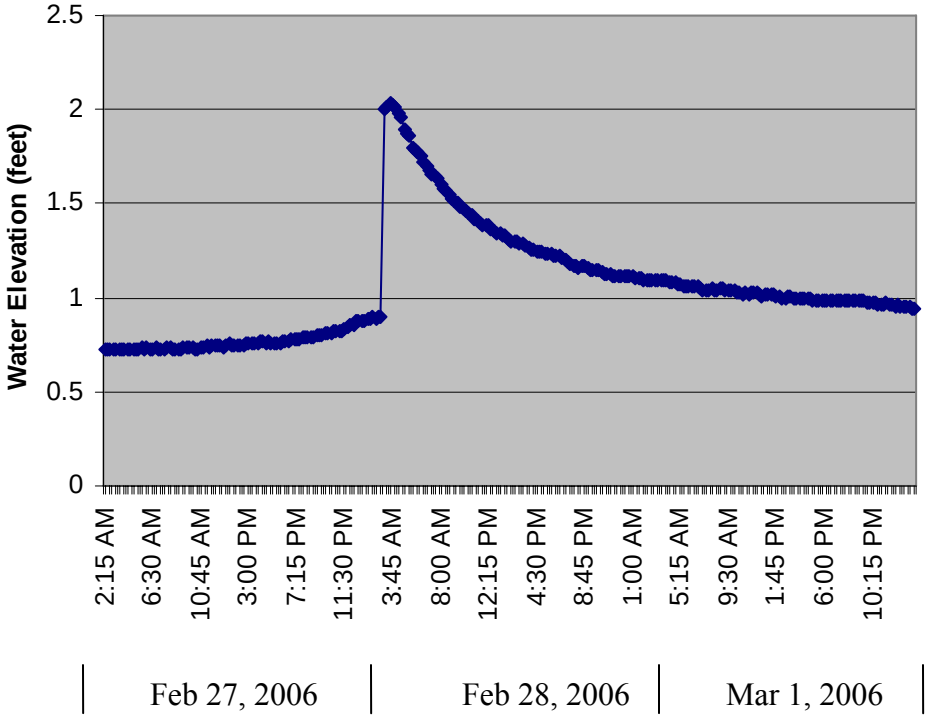


Figure 15. Water Elevation for Cantua Creek



METHODS

FIELD METHODS

Discrete water samples were collected for analysis of various pesticides, metals and nutrients, of toxicity and of physical parameters (Table 5)

Table 5. Summary of Sample Container, Volume, Initial Preservation and Holding Time Recommendations for Water and Sediment Samples

Parameters for Analysis in WATER Samples	Recommended Containers (all containers pre-cleaned)	Typical Sample Volume (ml)	Initial Field Preservation	Maximum Holding Time (analysis must start by end of max)
Physical Parameters[1]				
Color	1 liter glass or polyethylene	500 ml	Cool to 4°C, dark	48 hours at 4°C, dark
Turbidity	"	150 ml	"	48 hours at 4°C, dark
Total Dissolved Solids (TDS)	"	1000 ml	"	7 days at 4°C, dark

Table 5 (Continued)**.** Summary of Sample Container, Volume, Initial Preservation, and Holding Time Recommendations for Water Samples

Nutrients[1]				
Ortho-phosphate ($O\text{-}PO_4$)	Trace clean and certified polyethylene	100 ml	Cool to 4°C, dark	48 hours at 4°C, dark
Nitrate + Nitrite ($NO_3 + NO_2$)	"	150 ml	"	Recommend 48 hours at 4°C, dark or If preserved, H_2SO_4 pH<2 28 days, either one at 4°C, dark
Nitrite (NO_2)	"	150 ml	"	48 hours at 4°C, dark
Total Keldjahl Nitrogen (TKN)	"	600 ml	"	Recommend 48 hours at 4°C, dark or If preserved, H_2SO_4 pH<2 Recommend: 7 days Maximum: 28 days Either one at 4°C, dark
Ammonia (NH_3)	"	500 ml	"	Recommend 48 hours at 4°C, dark or If preserved, H_2SO_4 pH<2 Recommend: 7 days Maximum: 28 days Either one at 4°C, dark
(1) NOTE: The volume of water necessary to collect in order to analyze for the above constituents is typically combined in multiple 1-liter polyethylene bottles, which also allows enough volume for possible re-analysis and for conducting lab spike duplicates. This is possible since the same laboratory is conducting all of the above analyses; otherwise, individual volumes apply.				
Parameters for Analysis in WATER Samples	**Recommended Containers (all containers pre-cleaned)**	**Typical Sample Volume (ml)**	**Initial Field Preservation**	**Maximum Holding Time (analysis must start by end of max)**
TOC and THMs in Drinking Water and Surface Water				
Total Organic Carbon (TOC)	40 ml glass vial	40 ml (one vial)	Cool to 4°C, dark	28 days at 4°C, dark
Trace Elements in Water Samples				
TOTAL ELEMENTS (As, B, Cd, Cu, K, Ni, P, Pb, Se, Zn)	60 ml polyethylene bottle, pre-cleaned in lab using HNO_3	60 ml (one bottle)	Cool to 4°C, dark. Acidify in lab within 48 hrs, with ultra-pure HNO_3 for pH<2.	Once sample is acidified, can store up to 6 months at room temperature
HARDNESS	200 ml polyethylene or glass bottle	200 ml (one bottle)	Cool to 4°C, dark	48 hours at 4°C, dark

Table 5 (Continued)**.** Summary of Sample Container, Volume, Initial Preservation, and Holding Time Recommendations for Water Samples

Synthetic Organic Compounds in Water Samples				
PESTICIDES & HERBICIDES* □Organophosphate Pesticides □Organochlorine Pesticides □Carbamates □Pyrethroids □Herbicides	1-L I-Chem 200-series certified trace clean amber glass bottle, with Teflon lid-liner (per each sample type)	1000 ml (one container) *Each sample type requires 1000 ml in a separate container	Cool to 4°C, dark If chlorine is present, add 0.1g sodium thiosulfate	Keep at 4°C, dark, up to 7 days. Extraction must be performed within the 7 days; analysis must be performed within 40 days of extraction.
Toxicity Testing - Water Samples				
TOXICITY IN WATER	Two-Four 2.25 L I-Chem 200-series certified amber glass bottles	9000 ml	Cool to 4°C, dark	36 hours at 4°C, dark

The samples were collected following the Standard Operating Procedures included in the Quality Assurance Project Plan developed for the Agricultural Waiver Monitoring Program. The samples were put on ice immediately after collection. The Water Column Toxicity samples were delivered to the CA Department Fish and Game Aquatic Toxicology Laboratory, the metals samples to the Department of Fish & Game Marine Pollution Studies Laboratory in Moss Landing. All other samples were analyzed at the Department of Fish and Game Fish and Wildlife Water Pollution Control Laboratory in Rancho Cordova.

Temperature, pH, conductivity (EC) and dissolved oxygen (DO) were measured using Oakton* pH/Con 10 Multiparameter Meter and Oakton* Accumet Dissolved Oxygen Meter. Field measurements, weather and water conditions were noted on field sheets as well as the sampling time, the number of collected samples and quality control samples.

ANALYTICAL METHODS

Organic Analytical Methods

Volatile Organic Compounds (EPA 8260)

The volatile compounds were introduced into the gas chromatograph (GC) by the purge-and-trap method. Samples were transferred to a purge and trap sparger and purged with inert gas. The target analytes were trapped during the purge cycle on a Tenax trap. After the purge cycle was completed, the Tenax trap was heated and the analytes were introduced directly into a capillary column for analysis. The (GC) column was temperature-programmed to separate the analytes, which were then detected with a mass spectrometer (MS) interfaced to the gas chromatograph (GC). Analytes eluted from the capillary column were introduced into the MS via direct connection. Identification of target analytes was accomplished by comparing their

retention time and mass spectra with the retention time and electron impact spectra of authentic standards. Quantitation was accomplished by comparing the response of a major (quantitation) ion relative to an internal standard using a five-point calibration curve.

Pesticide/herbicide Analytical Methods

Sample Extraction for Organochlorines, Organophosphorus, Triazines, Selective Herbicides, and Pyrethroids – EPA 3510C
A measured volume of sample (1.0 L) was extracted with methylene chloride (DCM) using a separatory funnel (liq/liq technique). The DCM extract was dried with sodium sulfate, evaporated using a Kuderna-Danish (K-D) apparatus and solvent exchanged into petroleum ether. The extract was concentrated using a micro-snyder (micro K-D) apparatus to approximately 1.0 ml and finally adjusted to 2.0 ml with iso-octane.

Sample Preparation for Selective Herbicides – EPA 3535
A measured volume of sample (1.0 L) was acidified with sulfuric acid: DI water (1:1) to pH $\leq$ 2, the acidified sample was then eluted through a pre-conditioned C18 (Sep-Pak) column. The target herbicides were eluted from the C18 column with 2.0 ml methanol.

Sample Preparation for Carbamates – EPA 3510CM
A measured volume of sample (1.0 L) was extracted with methylene chloride (DCM) using a separatory funnel. The DCM extract was dried with sodium sulfate, evaporated to almost dryness using rotary evaporator and finally adjusted to 2.0 ml with methanol.

Instrumentation Methods

Organochlorines Pesticides – EPA 8081AM
Organochlorines were analyzed using an Agilent 6890 plus, equipped with two micro ECD detectors, EPC split-splitless injector, Agilent auto-sampler and dual 60 meter capillary columns (DB5 and DB17)(0.25 mm ID and 0.25 µm film thickness) connected to a single injection port using a "Y" fit connector.

Organophosphorus Pesticides – EPA 8141AM
The samples were analyzed using an Agilent 6890 plus, equipped with two FPD detectors in phosphorous mode, EPC split-splitless injector, Agilent auto-sampler and dual 60 meter capillary columns (DB5 and DB17) (0.25 mm ID and 0.25 µm film thickness) connected to a single injection port using a "Y" fit connector.

Triazines – EPA 619 M
Triazine herbicides were analyzed using a GC Varian 3600, equipped with two TSD detectors, 7890 injector, 8200 autosampler and dual 30 meter capillary columns (DB5 and DB17) (0.25 mm ID and 0.25 µm film thickness) connected to a single injection port using a "Y" fit connector.

Selective Herbicides – EPA 1656M

Some herbicides were analyzed using an Agilent 1100 high performance liquid chromatograph/mass spectrometer (HPLC-MS) using atmospheric pressure electrospray ionization in negative and/or positive mode.

Glyphosate/AMPA – EPA 547

The samples were analyzed by direct injection using a Hewlett Packard 1100 HPLC equipped with post column derivatization, and fluorescence detector.

Pyrethroids – EPA 1660M

Pyrethroids were analyzed using an Agilent 6890 plus, equipped with two micro ECD detectors, EPC split-splitless injector, Agilent auto-sampler and dual 60 meter capillary columns (DB5 and DB17)(0.25 mm ID and 0.25 μm film thickness) connected to a single injection port using a "Y" fit connector.

Carbamates – EPA 632M

Carbamates were analyzed by Agilent 1100 liquid chromatograph/mass spectrometer (HPLC-MS) using atmospheric pressure electrospray ionization in positive mode.

Inorganic Analytical Methods

Trace Elements by ICP-MS – EPA 1638

Inductively coupled plasma-mass spectrophotometer was used in the analysis of water samples. No digestion was required prior to analysis for dissolved elements in water samples. The method measures ions produced by a radio frequency inductively coupled plasma. Analyte species originating in a liquid were nebulized and the resulting aerosol transported by plasma gas and introduced by means of an interface into a mass spectrometer. The ions produced in the plasma were sorted according to their mass-to charge ratios and quantified with a channel electron multiplier. Interferences were assessed and valid corrections applied or the data was flagged to indicate problems. Interference correction included compensation for background ions contributed by the plasma gas, reagents, and constituents of the sample matrix.

Samples were run with no dilution. Standard curves were run for all elements of concern. All samples, standards, SRM's, and blanks were made up in a 1-2 % Nitric acid solution. Blanks, standard reference materials, matrix spikes and calibration standards were run with all samples.

Ammonia – EPA 350.3

Ammonia was determined by use of an ion selective electrode (ISE) specific for the ammonium ion. The electrode used a hydrophobic, gas permeable membrane, which separated the sample from an internal ammonium chloride solution. The sample ammonia diffused through the membrane and adjusted the pH of the internal solution. This change was translated into a relative millivolt reading displayed on the pH/ISE meter.

Color - SM 2120B BM
Color was determined using an automated colorimetric method equivalent to the visual comparison method, SM 2120B. Potassium hexachloroplatinate and cobalt(II) chloride hexahydrate were used to prepare the color standards. The samples and standards were buffered at pH 6.8 during analysis and the product read at 410nm. Because color is pH dependent, the pH at which color was determined was reported with results.

Ortho-phosphate – EPA 365.1 M
Ortho-phosphate was determined using an automated colorimetric method accomplished by flow injection analysis. The ortho-phosphate in the sample reacted with ammonium molybdate and antimony tartrate under acidic conditions. The product was then reduced by ascorbic acid to produce a blue color read at 880nm.

Nitrate + Nitrite as N – EPA 353.2
Nitrate plus nitrite was determined using an automated colorimetric method accomplished by flow injection analysis. The sample was passed through a cadmium column and the nitrate reduced to nitrite. The nitrite then reacted with sulfanilamide and N-(1-naphthyl) ethlyenediamine dihydrochloride forming a pink color which was read at 520 nm.

TDS – SM 2540 C
A representative sample aliquot was filtered through a glass fiber filter. The filtrate was then evaporated in a pre-weighed dish and then dried to constant weight at 180°C. The difference between the final dish weight and initial dish weight represented the total dissolved solids.

Turbidity – SM 2130B
The method was based upon a comparison of the intensity of light scattered by a sample under defined conditions with the intensity of light scattered by a standard reference suspension of formazin.

Hardness – SM 2340C
Hardness was defined as the sum of the calcium and magnesium concentrations, both expressed as calcium carbonate in mg/L. The sample with Calmagite indicator was pink in color when buffered to pH 10.0. EDTA was added as the titrant, and the Calmagite complexes of calcium and magnesium dissociated to form their more stable EDTA complex. At the end point, the solution turns blue as a result of the dissociated Calmagite. The amount of EDTA used therefore provides a measure of calcium and magnesium in the water.

Table 6 summarizes the analytical methods and laboratory detection and reporting requirements for all the constituents except Water Column Toxicity and Sediment Toxicity.

Sediment Pesticide analysis

The extraction method for the sediment was a modification of USEPA Method #3550, Sonication Extraction for low concentrations of organics and pesticides. Approximately 20 g (±1.0 g) of sediment were removed, spiked with 50ng each of surrogates,

dibromooctoflourobiphenyl (DBOFB) and decachlorobiphenyl (DCBP) and dried with anhydrous magnesium sulfate. In case of high sulfur content sediment, 2g of activated copper metal were added to remove sulfur residue. The sample was sonicated with 50 ml of 50:50 methylene chloride:acetone (v/v) for 5 minutes in 3 s pulse mode using a high intensity ultrasonic processor (Model VCX 400, Sonics and Materials Inc., Newtown, CT, USA), decanted and filtered through a Whatman No. 41 filter paper filled with anhydrous magnesium sulfate. This procedure was repeated twice more with a sonication time of 3 minutes. The extract was then collected in an evaporative tube and reduced in volume to approximately 5 ml, under a stream of nitrogen in a TurboVap II evaporator (Zymark, Hopkinton, MA). After cooling, the extract was solvent exchanged with hexane and the volume further reduced to 2 ml.

A deactivated Florisil column was used to remove interference from the extract. The column was packed with 10g Florisil partially deactivated by mixing with distilled water (6% w/v) and a 1cm layer of anhydrous sodium sulfate was used to cap the Florisil. After the concentrated extract was transferred into the Florisil column, pesticides were eluted from the column with 50 mL of 30% diethyl ether in hexane solution (v/v). The eluent was concentrated, dissolved in 2 mL of hexane and transferred to clean screw-cap vials, sealed with a Teflon lined lid and stored at -4°C until analysis on the GC. Additional dilution steps may have been needed for some field-collected agricultural samples due to elevated pesticide concentrations.

Sediment samples were analyzed for the following pesticides: alpha-, beta-, delta-, and gamma-BHC, alpha- and gamma-chlordane, aldrin, endosulfan I and II, endosulfan sulfate, dieldrin, endrin, endrin aldehyde, endrin ketone, heptachlor, methoxychlor, heptachlor epoxide, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, chlorpyrifos, *cis* and *trans* –permethrin, bifenthrin, esfenvalerate lambda-cyhalothrin, cypermethrin, cyfluthrin, and deltamethrin. The detection limit for all analytes was 1 ng/g (or less if determined achievable in preliminary tests). The method validation was conducted with control sediment spiked with each of the target pesticides. Analyses were conducted using a Hewlett Packard 6890 Series Gas Chromatograph System (HP6890GC) equipped with an electron capture detector (ECD).

Metals analysis

Analysis for metals was performed on those samples determined to be toxic and an equal number of randomly selected non-toxic samples. The total number of samples selected for metals analysis did not exceed 50% of the samples collected. Analyses were done by ICP for Al, As, Cu, Cd, Cr, Ni, Pb, Se and Zn. Detection limits for these analytes range from 1-5 mg/kg (except 20-25 mg/kg for Al and Se). Analytical work was performed by the Department of Fish & Game Marine Pollution Studies Laboratory in Moss Landing.

Toxicity Testing Methods

The Department Fish and Game Aquatic Toxicology Laboratory conducted water column toxicity testing during the dormant season. Acute toxicity testing was conducted using the invertebrate *Ceriodaphnia dubia* and the larval fathead minnow *Pimephales promelas* according to standard USEPA (2002a) acute toxicity methods. In addition to identifying toxicity caused by herbicides, 96-hour tests with the green algae *Selenastrum capricornutum* were conducted according to standard USEPA (2002b) methods.

Grain Size analysis

The sediment was washed on a series of stacked brass or stainless steel sieves (1000, 500, 250, 125, and 63 μm), and the material passing through the smallest sieve collected in a large stainless steel bowl. The contents of each sieve were transferred to an aluminum pan, dried at 100°C overnight and weighed. The contents of the bowl (representing the silt and clay fraction) were allowed to settle for 24-48 hr, the overlying water poured off, and the particles transferred to an aluminum pan for drying and weighing.

Toxicity testing

Sediment toxicity was assessed using a 10-day survival and growth test with *Hyalella azteca* (EPA 600/R-99/064). U.S. EPA, as a standard test for sediment toxicity testing has promulgated this test.

CNH analysis

Inorganic carbon was removed from the sample by: 1) drying at 100°C overnight; 2) grinding the sample with a mortar and pestle; 3) exposure to hydrochloric acid vapors overnight); 4) driving off re-adsorbed water by drying at 100°C for 2-4 hr; and 5) storage of sample at –20°C or in a dessicator until analysis. CHN analyses were done by the Horn Point Environmental Laboratory, University of Maryland, Cambridge, MD using a CE-440 Elemental Analyzer from Exeter Analytical.

Table 6. Laboratory Detection and Reporting Limit Requirements

MediumName	MethodName	AnalyteName	FractionName	Units	ChemAgency Code	MDL	RL	INSTRUMENTATION
GENERAL PARAMETERS								
samplewater	SM 2120B Mod	Color	None	Color Units	DFG-WPCL	2.0	5.0	FIA
samplewater	SM 2130B	Turbidity	None	NTU	DFG-WPCL	1	1	Nephelometer
samplewater	SM 2540C	Solids	Total Dissolved	mg/L	DFG-WPCL	10	10	
samplewater	EPA 415.1	Organic Carbon	Total	mg/L	DFG-WPCL	0.2	0.5	
PATHOGENS								
samplewater	Quantitray	E Coli	None	MPN/100mL	Contract Lab			
TRIHALOMETHANES (THM)								
samplewater	EPA 8260	Chloroform	None	µg/L	DFG-WPCL	0.05	2	GC-MS/Purge and Trap
samplewater	EPA 8260	Bromoform	None	µg/L	DFG-WPCL	0.2	2	GC-MS/Purge and Trap
samplewater	EPA 8260	Dibromochloromethane	None	µg/L	DFG-WPCL	0.08	2	GC-MS/Purge and Trap
samplewater	EPA 8260	Bromodichloromethane	None	µg/L	DFG-WPCL	0.06	2	GC-MS/Purge and Trap
TRACE ELEMENTS								
samplewater	EPA 1638	Arsenic	Dissolved/Total	µg/L	MPSL-DFG	0.10	0.30	ICP-MS
samplewater	EPA 1638	Boron	Dissolved/Total	µg/L	MPSL-DFG	1	5	ICP-MS
samplewater	EPA 1638	Cadmium	Dissolved/Total	µg/L	MPSL-DFG	0.002	0.01	ICP-MS
samplewater	EPA 1638	Copper	Dissolved/Total	µg/L	MPSL-DFG	0.003	0.01	ICP-MS
samplewater	EPA 1638	Lead	Dissolved/Total	µg/L	MPSL-DFG	0.006	0.01	ICP-MS
samplewater	EPA 1638	Nickel	Dissolved/Total	µg/L	MPSL-DFG	0.006	0.02	ICP-MS
samplewater	EPA 1638	Phosphorous	Dissolved/Total	µg/L	MPSL-DFG	1.0	3.0	ICP-MS
samplewater	EPA 1638	Selenium	Dissolved/Total	µg/L	MPSL-DFG	0.10	0.30	ICP-MS
samplewater	EPA 1638	Zinc	Dissolved/Total	µg/L	MPSL-DFG	0.02	0.06	ICP-MS
INORGANIC (CONVENTIONAL ANALYTES)								
samplewater	EPA 350.3	Ammonia as N	None	mg/L	DFG-WPCL	0.04	0.1	ISE
samplewater	EPA 351.2	Nitrogen as N, Total Kjeldahl (TKN)	None	mg/L	DFG-WPCL	0.12	0.25	FIA
samplewater	EPA 353.2	Nitrate+nitrite as N	None	mg/L	DFG-WPCL	0.005	0.01	FIA
samplewater	EPA 353.2	Nitrite as N	None	mg/L	DFG-WPCL	0.005	0.01	FIA
samplewater	EPA 365.1Mod	Phosphate as P, Ortho	None	mg/L	DFG-WPCL	0.005	0.01	FIA
ORGANOCHLORINE PESTICIDES								
samplewater	EPA 608/8081A	DDD(o,p')	None	µg/L	DFG-WPCL	0.001	0.005	GC-ECD/GC-MS
samplewater	EPA 608/8081A	DDD(p,p')	None	µg/L	DFG-WPCL	0.001	0.005	GC-ECD/GC-MS
samplewater	EPA 608/8081A	DDE(o,p')	None	µg/L	DFG-WPCL	0.001	0.005	GC-ECD/GC-MS

Table 6. Laboratory Detection and Reporting Limit Requirements (Continued)

MediumName	MethodName	AnalyteName	FractionName	Units	ChemAgency Code	MDL	RL	INSTRUMENTATION
samplewater	EPA 608/8081A	DDE(p,p')	None	µg/L	DFG-WPCL	0.001	0.005	GC-ECD/GC-MS
samplewater	EPA 608/8081A	DDT(o,p')	None	µg/L	DFG-WPCL	0.001	0.005	GC-ECD/GC-MS
samplewater	EPA 608/8081A	DDT(p,p')	None	µg/L	DFG-WPCL	0.002	0.005	GC-ECD/GC-MS
samplewater	EPA 608/8081A	Dicofol	None	µg/L	DFG-WPCL	0.05	0.1	GC-ECD/GC-MS
samplewater	EPA 608/8081A	Dieldrin	None	µg/L	DFG-WPCL	0.001	0.002	GC-ECD/GC-MS
samplewater	EPA 608/8081A	Endrin	None	µg/L	DFG-WPCL	0.002	0.005	GC-ECD/GC-MS
samplewater	EPA 608/8081A	Methoxychlor	None	µg/L	DFG-WPCL	0.001	0.002	GC-ECD/GC-MS
HERBICIDES								
samplewater	EPA 619	Atrazine	None	µg/L	DFG-WPCL	0.02	0.05	GC-NPD/GC-MS
samplewater	EPA 619	Cyanazine	None	µg/L	DFG-WPCL	0.02	0.05	GC-NPD/GC-MS
samplewater	EPA 547	Glyphosate	None	µg/L	DFG-WPCL	2.0	5.0	HPLC-FLUORESENCE
samplewater	WPCL	Molinate	None	µg/L	DFG-WPCL	0.1	0.2	GC-NPD/GC-MS
samplewater	WPCL	Paraquat dichloride	None	µg/L	DFG-WPCL	0.2	0.5	HPLC-MS
samplewater	EPA 619	Simazine	None	µg/L	DFG-WPCL	0.02	0.05	GC-NPD
samplewater	WPCL	Thiobencarb	None	µg/L	DFG-WPCL	0.1	0.2	GC-NPD/GC-MS
CARBAMATE PESTICIDES/HERBICIDES								
samplewater	EPA 632 Mod	Aldicarb	None	µg/L	DFG-WPCL	0.01	0.05	HPLC-MS
samplewater	EPA 632 Mod	Captan	None	µg/L	DFG-WPCL	0.05	0.1	HPLC-MS
samplewater	EPA 632 Mod	Carbaryl	None	µg/L	DFG-WPCL	0.01	0.02	HPLC-MS
samplewater	EPA 632 Mod	Carbofuran	None	µg/L	DFG-WPCL	0.01	0.02	HPLC-MS
samplewater	EPA 632 Mod	Diuron	None	µg/L	DFG-WPCL	0.002	0.005	HPLC-MS
samplewater	EPA 632 Mod	Linuron	None	µg/L	DFG-WPCL	0.002	0.005	HPLC-MS
samplewater	EPA 632 Mod	Methiocarb	None	µg/L	DFG-WPCL	0.15	0.25	HPLC-MS
samplewater	EPA 632 Mod	Methomyl	None	µg/L	DFG-WPCL	0.01	0.02	HPLC-MS
PYRETHROID PESTICIDES								
samplewater	EPA 1660 Mod	Biphenthrin	None	µg/L	DFG-WPCL	0.005	0.01	GC-ECD/GC-MS
samplewater	EPA 1660 Mod	Cyfluthrin	None	µg/L	DFG-WPCL	0.005	0.01	GC-ECD/GC-MS
samplewater	EPA 1660 Mod	Cypermethrin	None	µg/L	DFG-WPCL	0.01	0.05	GC-ECD/GC-MS
samplewater	EPA 1660 Mod	Esfenvalerate/Fenvalerate	None	µg/L	DFG-WPCL	0.002	0.01	GC-ECD/GC-MS
samplewater	EPA 1660 Mod	Permethrin	None	µg/L	DFG-WPCL	0.01	0.02	GC-ECD/GC-MS
ORGANOPHOSPHATE PESTICIDES								
samplewater	EPA 8140,8141A	Azinphos-Methyl	None	µg/L	DFG-WPCL	0.03	0.05	GC-FPD
samplewater	EPA 8140,8141A	Chlorpyrifos	None	µg/L	DFG-WPCL	0.003	0.005	GC-FPD
samplewater	EPA 8140,8141A	Diazinon	None	µg/L	DFG-WPCL	0.003	0.005	GC-FPD

Table 6. Laboratory Detection and Reporting Limit Requirements (Continued)

MediumName	MethodName	AnalyteName	FractionName	Units	ChemAgency Code	MDL	RL	INSTRUMENTATION
samplewater	EPA 8140,8141A	Dimethoate	None	µg/L	DFG-WPCL	0.03	0.05	GC-FPD
samplewater	EPA 8140,8141A	Disulfoton	None	µg/L	DFG-WPCL	0.01	0.05	GC-FPD
samplewater	EPA 8140,8141A	Malathion	None	µg/L	DFG-WPCL	0.03	0.05	GC-FPD
samplewater	EPA 8140,8141A	Methamidophos	None	µg/L	DFG-WPCL	0.10	0.2	GC-FPD
samplewater	EPA 8140,8141A	Methidathion	None	µg/L	DFG-WPCL	0.03	0.05	GC-FPD
samplewater	EPA 8140,8141A	Methyl Parathion	None	µg/L	DFG-WPCL	0.01	0.05	GC-FPD
samplewater	EPA 8140,8141A	Parathion	None	µg/L	DFG-WPCL	0.01	0.02	GC-FPD
samplewater	EPA 8140,8141A	Phorate	None	µg/L	DFG-WPCL	0.05	0.2	GC-FPD
samplewater	EPA 8140,8141A	Phosmet	None	µg/L	DFG-WPCL	0.05	0.2	GC-FPD

QUALITY ASSURANCE PROCEDURES

Quality assurance samples were collected and analyzed to guarantee that the data generated during the analytical phase of the project fulfill Quality Control specifications for precision, accuracy, representativeness, comparability and completeness (PARC). Three types of quality assurance samples were evaluated: field blanks, field duplicates and matrix spike samples.

Field blanks were generated to demonstrate that neither the sampling procedures nor atmospheric exposure resulted in contaminated samples. Field blanks were collected at a rate of 5% of the total number of samples along with the associated environmental sample. Field blanks were assigned randomly to sampling sites and were distinguished from the environmental sample through a time offset of 1 minute. Water used for the blanks consisted of deionized water from the Aquatic Biology and Environmental Sciences Building at UC Davis for all blanks except the blanks established for metals and water column toxicity. MilliQ water was used for the metal samples, and tap water from DFG-ATL for the toxicity samples.

Field duplicate samples demonstrate the precision of the analytical process. Duplicates were collected in rapid succession and in an identical manner to the associated environmental sample. Duplicates were collected at a rate of 5% of the total samples and were assigned randomly to sample sites. Duplicates were distinguished from the environmental sample through a time offset of 3 minutes. For cases where contaminants were detected in both samples, the assessment of the difference in concentration between the environmental sample and the paired replicate was determined by calculating the relative percent difference between the two values, which is defined as:

$$RPD = (([C_{env} - C_{rep}] / ([C_{env} + C_{rep}]/2)) * 100$$

RPD = the relative percent difference

C_{env} = concentration of pesticide in environmental sample

C_{rep} = concentration of pesticide in replicate sample.

If an RPD greater than 25% is confirmed by reanalysis, the environmental results were qualified as estimated.

The purpose of analyzing matrix spikes and matrix spike duplicates was to demonstrate the performance of the analytical method in a particular sample matrix. Matrix spike and matrix spike duplicate samples were collected at a rate of 5%, assigned randomly to sites and labeled with a time offset of 9 minutes. Recovery is the accuracy of an analytical test measured against a known analyte addition to a sample.

Recovery is calculated as follows:

Recovery = ((Matrix plus spike result – Matrix result) * 100) / expected Matrix plus spike result

If matrix spike recovery of any analyte was outside of the acceptable range, the result was determined to have failed the acceptance criteria (80-120%).

RESULTS

PESTICIDES

During the 2006 dormant season, we collected fifty samples from 10 sites for the analyses of seven pesticide groups: organochlorine pesticides (OCH), organophosphate pesticides (OP), carbamates, herbicides, pyrethroids, acaricides, and fungicides. Los Gatos Creek at El Dorado Avenue (FT34) was dry during both storm events; therefore water samples could not be collected at this location.

The water samples are still being analyzed at the DFG lab, thus pesticide results cannot be provided in this quarterly report. The results will be included in subsequent reports.

WATER COLUMN TOXICITY

Thirty-five water column samples were collected and tested for toxicity (Table 7) during the storm sampling 2005/2006. Tests were run with *Ceriodaphnia dubia*, *Pimephales promelas*, *Selenastrum capricornutum* in 96-hour tests. Results provided here are for the first storm and account for 17 water samples. In the tests run with *Ceriodaphnia dubia*, one sample showed significantly different survival rates compared to control samples, which equals a frequency of 6%. Two samples showed significantly different survival from control samples in tests with *Pimephales promelas*. Two samples also showed significantly different growth compared to *Selenastrum capricornutum* control samples. In both the fish and algae tests, significantly different results occurred with a frequency of 12%.

INORGANIC RESULTS

During the 2006 dormant season, 35 surface water samples were collected and analyzed for nutrients (ammonia, nitrate+nitrite, nitrite, orthophosphate, and phosphorus) (Table 8), physical parameters (color, total dissolved solids, turbidity) (Table 9), hardness (Table 9), and total organic carbon. Nutrients, physical parameters and hardness data are available for the first storm event only and incorporates the results from 17 water samples. The phosphorus, total organic carbon as well as the nutrient, physical parameter and hardness data for the second storm event will be provided in subsequent reports as sample results have not been provided by the analytical laboratory.

Nutrients

Nitrate+nitite, nitrite, and orthophosphate were detected in all of the 17 water samples. Ammonia was detected in 82% of the first storm samples with the highest concentration detected at Fresno Slough at Huntsman Avenue (FT32) with 0.415 mg/L and the lowest concentration at Butte Creek at Gridley Road (CS30) with 0.044mg/L. The highest concentrations of nitrate+nitrite as well as nitrite were found at Colusa Basin Drain #5 (CS28) with 0.694 mg/L and 0.0211 mg/L, respectively. The lowest concentrations for these nutrients were found at Fresno Slough (FT32) with 0.0248 mg/L of nitrate+nitrite and Mud Creek at Sacramento Avenue (CS32) with 0.0021 mg/L of nitrite. Fresno Slough (FT32) had the highest concentration of orthophosphate with 1.47mg/L and Jack Slough (CS25) had the lowest concentration with 0.0199 mg/L.

Hardness and Physical Parameters

Colusa Basin Drain #5 (CS28) had the hardest water with 164 mg/L $CaCO_3$ and Mud Creek (CS32) had the lowest concentration of $CaCO_3$ with 32.5 mg/L.

The maximum value for color (45 color units) was found at Stony Creek at Highway 45 (CS33) while the least color (8 color units) was at Mud Creek (CS32). Total dissolved solids were the highest at Fresno Slough (FT32) with 1480 mg/L and the lowest at Mud Creek (CS32) with 63 mg/L. Fresno Slough also had the most turbid water (1300 NTU) while Mud Creek also had the least turbid water (2.6 NTU).

METALS

Thirty-five surface water samples were analyzed for eight metals (arsenic, boron, cadmium, copper, lead, nickel, selenium, and zinc). These data are not presently available and will be included in the next reports.

FIELD PARAMETERS

Dissolved oxygen, pH, specific conductivity, and water temperature were measured during thirty-five sampling events (Table 10). Dissolved oxygen ranged from 2.27 mg/L (CS33) to 11.94 mg/L (FT32). Values for pH were between 4.48 (CS32) and 8.80 (CS31). Specific conductivity values were found between 74 µs (CS32) and 1666 µs (FT32), while water temperatures ranged from 7.1 ºC (CS25) to 18.4 ºC (FT33).

SEDIMENT

No sediment was collected during the 2006 dormant season. The appendix, however, includes the chemistry and toxicity results from sediment collected in previous seasons (Irrigation 2004, Dormant 2005, and Irrigation 2005). Sediment samples were analyzed by Don Weston at the University California, Berkeley as well as staff at Southern Illinois University.

Table 7. Summary of Water Column Toxicity detected during the first storm event for Dormant 2006

Site ID	Date	Time	Ceriodaphnia dubia (% survival) (**indicates significantly different from control group)	Pimephales promelas (% survival) (**indicates significantly different to control group)	Selenastrum capricornutum (Y indicates significantly different growth to control group)
CS25	**15/Jan/2006**	**9:40**	100	95	N
CS25	16/Jan/2006	10:00	100	90	**Y**
CS26	**15/Jan/2006**	**12:20**	95	100	N
CS26	16/Jan/2006	11:30	95	100	**Y**
CS27	**15/Jan/2006**	**16:00**	100	100	N
CS27	16/Jan/2006	15:10	100	100	N
CS28	**15/Jan/2006**	**14:00**	100	100	N
CS28	16/Jan/2006	13:20	100	95	N
CS30	**15/Jan/2006**	**12:20**	100	93	N
CS30	16/Jan/2006	11:10	100	100	N
CS31	**15/Jan/2006**	**11:30**	100	98	N
CS31	16/Jan/2006	10:30	100	100	N
CS32	**15/Jan/2006**	**10:00**	95	**83****	N
CS32	16/Jan/2006	8:50	100	**78****	N
CS33	**15/Jan/2006**	**9:00**	90	98	N
CS33	16/Jan/2006	8:00	90	93	N
FT32	**15/Jan/2006**	**9:30**	**0****	95	N
Total number of samples			**17**	**17**	**17**
Frequency (%)			**6%**	**12%**	**12%**

Table 8. Summary of nutrients detected during the first storm event for Dormant 2006

Site ID	Date	Time	Ammonia as N (mg/L)	Nitrate + Nitrite as N (mg/L)	Nitrite as N (mg/L)	OrthoPhosphate as P (mg/L)
CS25	**15/Jan/2006**	**9:40**	0.138	0.221	0.0097	0.024
CS25	16/Jan/2006	10:00	0.131	0.172	0.0079	0.0199
CS26	**15/Jan/2006**	**12:20**	ND	0.17	0.0028	0.0419
CS26	16/Jan/2006	11:30	0.075	0.167	0.0024	0.0417
CS27	**15/Jan/2006**	**16:00**	0.074	0.366	0.0156	0.142
CS27	16/Jan/2006	15:10	0.098	0.372	0.016	0.146
CS28	**15/Jan/2006**	**14:00**	0.099	0.668	0.021	0.116
CS28	16/Jan/2006	13:20	0.114	0.694	0.0211	0.127
CS30	**15/Jan/2006**	**12:20**	0.044	0.181	0.0041	0.0409
CS30	16/Jan/2006	11:10	0.054	0.166	0.0044	0.0483
CS31	**15/Jan/2006**	**11:30**	0.063	0.624	0.0159	0.0959
CS31	16/Jan/2006	10:30	0.06	0.636	0.0161	0.094
CS32	**15/Jan/2006**	**10:00**	ND	0.163	0.0021	0.0332
CS32	16/Jan/2006	8:50	ND	0.284	0.0021	0.0356
CS33	**15/Jan/2006**	**9:00**	0.05	0.325	0.0024	0.0255
CS33	16/Jan/2006	8:00	0.097	0.336	0.0034	0.0259
FT32	**15/Jan/2006**	**9:30**	0.415	0.0248	0.0125	1.47
Maximum			0.415	0.694	0.0211	1.47
Minimum			0.044	0.0248	0.0021	0.0199
Median			0.074	0.284	0.0079	0.0419
90th Percentile			0.1338	0.6488	0.01806	0.1436
# of Samples			17	17	17	17
Frequency%			82	100	100	100

ND indicates values that are below quantification limit

Table 9. Summary of inorganic constituents detected during the first storm event for Dormant 2006

Site ID	Date	Time	Hardness as CaCO3 (mg/L)	Color (color units)	Total Dissolved Solids (mg/L)	Turbidity (NTU)
CS25	**15/Jan/2006**	**9:40**	50.9	25	127	60
CS25	16/Jan/2006	10:00	50.2	19	128	65
CS26	**15/Jan/2006**	**12:20**	49.2	12	98	22
CS26	16/Jan/2006	11:30	41.7	17	84	44
CS27	**15/Jan/2006**	**16:00**	138	25	318	50
CS27	16/Jan/2006	15:10	145	24	272	41
CS28	**15/Jan/2006**	**14:00**	164	22	367	50
CS28	16/Jan/2006	13:20	161	20	326	40
CS30	**15/Jan/2006**	**12:20**	52.3	11	96	23
CS30	16/Jan/2006	11:10	60.6	10	112	14
CS31	**15/Jan/2006**	**11:30**	124	16	144	16
CS31	16/Jan/2006	10:30	126	16	161	14
CS32	**15/Jan/2006**	**10:00**	32.5	10	79	5.8
CS32	16/Jan/2006	8:50	36.5	8	63	2.6
CS33	**15/Jan/2006**	**9:00**	119	9	187	36
CS33	16/Jan/2006	8:00	120	45	188	32
FT32	**15/Jan/2006**	**9:30**	136	43	1480	1300
Maximum			164	45	1480	1300
Minimum			32.5	8	63	2.6
Median			119	17	144	36
90th Percentile			151.4	32.2	342.4	62
# of Samples			17	17	17	17
Frequency%			100	100	100	100

Table 10. Summary of Field Parameters taken during both storm events for Dormant 2006

Site ID	Date	Time	Dissolved Oxygen (mg/L)	pH	Specific Conductivity (µS)	Water Temperature (°C)
CS25	**15/Jan/2006**	**9:40**	8.13	7.10	142.7	9.2
CS25	16/Jan/2006	10:00	8.94	7.07	151.3	7.1
CS25	27/Feb/2006	12:50	9.23	7.05	139.5	11.8
CS25	28/Feb/2006	15:20	8.78	6.73	93	12.7
CS26	**15/Jan/2006**	**12:20**	9.33	7.43	139.8	15.3
CS26	16/Jan/2006	11:30	10.11	6.90	115.5	9.9
CS26	27/Feb/2006	11:30	9.05	7.47	257	11.7
CS26	28/Feb/2006	14:10	8.92	7.42	219	12.2
CS27	**15/Jan/2006**	**16:00**	7.35	7.55	438	10.5
CS27	16/Jan/2006	15:10	7.20	7.43	461	13.9
CS27	27/Feb/2006	8:40	9.14	8.18	1010	12.2
CS27	28/Feb/2006	11:10	8.37	7.87	429	12.1
CS28	**15/Jan/2006**	**14:00**	8.78	7.64	503	16.2
CS28	16/Jan/2006	13:20	9.12	7.66	500	9.5
CS28	27/Feb/2006	10:30	9.75	8.19	933	12
CS28	28/Feb/2006	12:30	8.29	7.78	342	11.8
CS30	**15/Jan/2006**	**12:20**	9.75	7.47	130.8	9.2
CS30	16/Jan/2006	11:10	10.13	7.48	157.2	8.3
CS30	27/Feb/2006	13:00	10.69	8.31	209	10.5
CS30	28/Feb/2006	14:10	9.30	7.99	107.7	11.5
CS31	**15/Jan/2006**	**11:30**	8.55	7.56	259	9.7
CS31	16/Jan/2006	10:30	8.58	7.54	267	9.5
CS31	27/Feb/2006	11:50	9.01	8.80	409	12.1
CS31	28/Feb/2006	11:30	8.46	8.22	182.4	11.6
CS32	**15/Jan/2006**	**10:00**	10.60	7.46	91.3	8
CS32	16/Jan/2006	8:50	10.90	7.39	105.3	7.7
CS32	27/Feb/2006	9:40	11.67	4.48	99.5	10.3
CS32	28/Feb/2006	9:30	10.10	8.28	74	10.4
CS33	**15/Jan/2006**	**9:00**	9.91	7.94	263	9.1
CS33	16/Jan/2006	8:00	10.44	7.80	268	9.4
CS33	27/Feb/2006	8:20	2.27	7.91	252	11.6
CS33	28/Feb/2006	8:20	10.39	8.59	266	10
FT32	**15/Jan/2006**	**9:30**	3.77	7.36	235	8.5
FT32	28/Feb/2006	10:20	9.23	8.20	1640	15.2
FT32	01/Mar/2006	10:30	11.94	8.52	1666	13.5
FT33	**15/Jan/2006**	**11:40**	10.71	7.61	303	11.4
FT33	28/Feb/2006	12:00	10.49	8.45	803	15.5
FT33	01/Mar/2006	11:10	9.89	8.56	1108	18.4
Maximum			11.94	8.80	1666	18.40
Minimum			2.27	4.48	74	7.1
Median			9.23	7.63	258	11.45
90th Percentile			10.70	8.47	956.10	15.23
# of Samples			38	38	38	38
Frequency%			100	100	100	100

Analytical Quality Assurance / Quality Control Results

In addition to the surface water samples collected, additional samples were collected for the purposes of quality control. A total of twenty-two field blanks, twenty-two field duplicates, and sixteen samples for matrix spikes were taken. Results for the quality control samples will be provided in subsequent reports.

Two toxicity samples were taken for a field blank and a field duplicate (Table 11). The results of the blank sample show the environmental sample being significantly different from the blank sample in the test using *Pimephales promelas* with 100% survival in the blank sample. The field duplicate was not significantly different from the corresponding environmental sample for any of the three toxicity tests.

Table 11. Summary of QA/QC toxicity data for the first storm event the during 2006 Dormant season

Site ID	Date	Time	Ceriodaphnia dubia (% survival) (**indicates significantly different from control group)	Pimephales promelas (% survival) (**indicates significantly different to control group)	Selenastrum capricornutum (Y indicates significantly different growth to control group)
FIELD BLANK					
CS32	16/Jan/2006	8:50	100	78**	N
CS32	16/Jan/2006	8:51	95	100	N
FIELD DUPLICATE					
CS28	15/Jan/2006	14:00	100	100	N
CS28	15/Jan/2006	14:03	100	100	N

The results for the hardness, physical parameters, and nutrients quality control samples collected during the first storm event are summarized in Table 12. No analytes were detected in any of the field blanks. None of the recovery percent differences (RPD) for field duplicates exceeded 25%. The field duplicate RPD for ammonia could not be calculated because no ammonia was detected in the environmental sample. All percent recoveries for the inorganic matrix spikes fell within the acceptance criteria (80-120%).

Table 12. Summary of QA/QC data for inorganic data collected during the first storm event for the 2006 Dormant Season

SiteID	Date	Time	Hardness as CaCO3 (mg/L)	Color (color units)	Total Dissolved Solids (mg/L)	Turbidity (NTU)	Ammonia as N (mg/L)	Nitrate + Nitrite as N (mg/L)	OrthoPhosphate as P (mg/L)	Nitrite as N (mg/L)
FIELD BLANKS										
CS28	16/Jan/2006	13:21	ND							
CS25	16/Jan/2006	10:01		ND	ND	ND				
CS30	15/Jan/2006	12:21					ND	ND	ND	ND
FIELD DUPLICATES (Samples listed are the environmental sample and the corresponding duplicate sample)										
CS33	15/Jan/2006	9:00	119							
CS33	15/Jan/2006	9:03	119							
RPD			0							
CS30	16/Jan/2006	11:10		10	112	14				
CS30	16/Jan/2006	11:13		11	126	18				
RPD				9.52	11.8	25				
CS32	16/Jan/2006	8:50					-0.04	0.284	0.0356	0.0021
CS32	16/Jan/2006	8:53					0.042	0.292	0.0343	0.0024
RPD							NC	2.78	3.72	13.3
MATRIX SPIKES (Samples listed are the matrix spike and matrix spike duplicate)										
FT32	15/Jan/2006	9:30		60						
FT32	15/Jan/2006	9:30		60						
RPD				0						
CS27	16/Jan/2006	15:10					0.962	0.461	0.291	0.0307
CS27	16/Jan/2006	15:10					0.974	0.462	0.291	0.0307
RPD							1.21	0.21	0	0

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APPENDIX I: SEDIMENT CHEMISTRY AND TOXICITY RESULTS FROM IRRIGATION 2004, DORMANT 2005, and IRRIGATION 2005

Table 13. Summary of Sediment Sites monitored during the Irrigation 2004, Dormant 2005, and Irrigation 2005 Seasons

Site ID	Site Name	County	Latitude	Longitude
CS02	Unnamed Canal at Cutting Road b/t Co. Road P and 6th Avenue	Tehama/Glenn	39.79770	-122.13170
CS03	Stony Creek on Hwy 45 near Road 24	Glenn	39.70981	-122.00221
CS06	Comanche Creek (Angel Slough) at Dayton Road	Butte	39.70014	-121.84878
CS07	Butte Creek on Durham Dayton Hwy	Butte	39.64593	-121.78492
CS09	Simmerly Slough at Ellis Avenue	Yuba	39.19807	-121.57696
CS10	Yankee Slough at Swanson Road	Sutter	38.96777	-121.51452
CS11	Bear River at Pleasant Grove Road	Sutter	38.98464	-121.48647
CS12	Unnamed Drain of Walker Creek on Co. Road 28	Glenn	39.66846	-122.22385
CS13	Unnamed Canal at Hwy 45	Colusa	38.96886	-121.86087
CS15	Spring Creek at Walnut Drive	Colusa	39.11975	-122.19318
CS21	Hamilton Slough at Hwy 99	Butte	39.42279	-121.68722
D01	Drain to San Joaquin River off South Manthey Road	San Joaquin	37.82340	-121.29850
D02	Drain to Grant Line Canal off Wing Levee Road	San Joaquin	37.82050	-121.40350
D03	Drain to North Canal at South Bonetti Road	San Joaquin	37.87150	-121.52560
FT03	Elbow Creek on Road 112 N of Visalia	Tulare	36.40293	-119.32213
FT05	Button Ditch on Avenue 368 west of Alta Avenue	Tulare	36.45856	-119.39828
FT08	West Reedley Ditch at East Adams Avenue	Fresno	36.63328	-119.44552
FT13	Kings River at Jackson Avenue Bridge	Kings	36.25584	-119.85412
FT14	Tulare River at Poplar Avenue	Tulare	36.05001	-119.50499
FT15	Calloway Canal at Hwy 46	Kern	35.60171	-119.26294
FT18	Drain to Fink Ditch at Central Avenue	Fresno	36.69138	-119.46543
FT19	Drain to Wooten Cr along Hill Road at Wooten Circle	Fresno	36.38505	-119.27781
FT23	St. Johns River at Road 108	Tulare	36.37453	-119.33127
FT24	Elk Bayou at Road 96	Tulare	36.12429	-119.35671
FT25	Melga Canal at Jersey Avenue	Kings	36.24044	-119.62431
FT31	Peoples Ditch at Elder Avenue	Kings	36.38668	-119.63774
NS04	Antelope Creek at Kansas Avenuenue	Tehama	40.12483	-122.11470
NS07	China Slough at Tehema and Vina Road	Tehama	39.93724	-122.04963
NSJ03	Unnamed canal at west end of Woodbridge Road	San Joaquin	38.15266	-121.49860
NSJ06	Mormon Slough on Jack Tone Road	San Joaquin	37.96505	-121.14793
NSJ18	Orestimba Creek at Kilburn Road	Stanislaus	37.39918	-121.03168
NSJ24	Dry Creek at J9	Stanislaus	37.65894	-120.77867
NSJ26	Ingalsbe Slough at J17	Merced	37.49167	-120.55640
NSJ28	Pixley Slough at Eightmile Road	San Joaquin	38.05765	-121.31350
NSJ29	Stevinson Lower Lateral at intersection of Faith Home Road	Merced	37.37240	-120.92194
NSJ31	CalAvenueris River at Pezzi Road	San Joaquin	38.04536	-121.19982
NSJ32	Bear Creek at Alpine Road	San Joaquin	38.07402	-121.21093
SED03	Butte Creek at Durnel Drive	Butte	39.58390	-121.80000
SED06	Juncture of Poso Drain and Pick Anderson Bypass	Merced	37.14060	-120.70720
SED07	Tom Paine Slough at Paradise Road	San Joaquin	37.77160	-121.38600
SED08	Unnamed Slough at Wildwood Road	San Joaquin	37.86330	-121.12820
SED09	Drain to Pixley Slough at Davis Road	San Joaquin	38.05640	-121.33320
SED10	Drain to Brack Dr at Woodbridge Road	San Joaquin	38.15270	-121.49890
SED11	Drain to North Canal along Bonetti Drive	San Joaquin	37.86430	-121.52000
SED12	Hospital Creek at Road 33	San Joaquin	37.61230	-121.25970
SED15	Ditch on S. side of Utica Avenue.	Kings	35.93418	-119.62700
SED16	Deer Creek at Alila Avenue.	Tulare	35.95007	-119.17570
SED17	Farmer's Ditch at Rt. 137 (Tulare Avenue)	Tulare	36.20884	-119.26043
SED18	Mill Creek at Road 168	Tulare	36.34812	-119.19781
SED19	King Ditch at Avenue 368 & Road 60	Tulare	36.46521	-119.43875

Table 13(cont'd). Summary of Sediment Sites monitored during the Irrigation 2004, Dormant 2005, and Irrigation 2005 Seasons

Site ID	Site Name	County	Latitude	Longitude
SED20	Knestirc Ditch at Rt. 201 (Avenue 400)	Tulare	36.51731	-119.43939
SED21	Near Kings River at Reed Avenue	Fresno	36.58525	-119.46010
SED22	Murphy Slough at Elm	Fresno	36.46018	-119.79870
SED23	Turner Ditch at Marks (aka 22nd Avenue)	Fresno	36.43824	-119.85109
SED24	Stinson Ditch at Kamm	Fresno	36.53146	-120.11618
SED25	PoSo Slough at Hudson	Fresno	36.97646	-120.54536
SED26	Holland Drain at Hudson	Fresno	36.92477	-120.51830
SED27	Stony Creek at Hwy 32	Glenn	39.74592	-122.10140
SED28	Colusa Drain at Hwy 162	Glenn	39.52191	-122.04444
SED29	Big Chico Creek at Grape	Butte	39.71668	-121.93079
SED30	Mud Creek at Meridian	Butte	39.74741	-121.91808
SJC516	Unnamed Canal at Howa Road	San Joaquin	37.87696	-121.37656
SJC517	Mid Roberts Island Drain at Woodsbro Road	San Joaquin	37.94163	-121.36930
SLO	Live Oak Slough at Eager Road	Sutter	39.18127	-121.66233
SS03	Willow Slough at Road 99	Yolo	38.60471	-121.78422
SS04	Unnamed Ditch at SW corner of Levee and Riego Road	Sutter	38.75116	-121.49370
SS05	North Main Canal at Sankey Road	Sutter	38.77978	-121.53259
SS06	Winters Canal at Road 86A	Yolo	38.66366	-122.01609
SS07	West Adams Canal at Road 89	Yolo	38.70488	-121.96093
SS09	N-S Ditch along Natomas Road	Sutter	38.74504	-121.49380
SSI	Unnamed Drain Along Sutter Island X Road	Sacramento	38.29572	-121.59263
SSJ01	Cottonwood Creek at Hwy 145 in Madera County	Madera	36.90021	-120.05489
SSJ03	Berenda Creek at Avenue 17.5 west of Madera	Madera	37.00448	-120.23746
SSJ04	Island Field Drain at Catrina Road	Merced	37.06142	-120.57228
SSJ05	Main Canal at Badger Flat Road	Merced	37.07120	-120.87680
SSJ07	Boundary Drain at Henry Miller Avenue	Merced	37.09884	-120.77777
SSJ08	Poso Drain at NE corner of Turner Island and Palazzo Road	Merced	37.12854	-120.70565
SSJ09	Sand Slough on Turner Island Road West of Merced Natl. Wildlife Refuge	Merced	37.17170	-120.68340
SSJ10	Owens Creek at Gurr Road	Merced	37.23534	-120.55953
SSJ12	Duck Slough at Arboleda Drive	San Joaquin	37.25734	-120.37818

Table 14. Summary of Organochlorine Pesticides detected during the Irrigation 2004 Season (µg/Kg)

SiteID	Date	Time	DDD(p,p')	DDE(p,p')	DDT(p,p')	Endrin	Methoxychlor	Aldrin	Chlordane, Alpha-	Chlordane, gamma-	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin Aldehyde	Endrin Ketone	HCH, alpha	HCH, beta	HCH, delta	HCH, gamma	Heptachlor	Heptachlor epoxide
CS02	30/Aug/2004	11:00			1.93								1.21							1.95	
CS03	09/Aug/2004	9:40			1.75																
CS09	10/Aug/2004	11:30	1.27	2.99	4.35																
CS10	10/Aug/2004	12:55			1.44																
CS12	09/Aug/2004	11:25		5.29	5.8																
CS13	30/Aug/2004	15:30		1.91	3.06																
CS15	09/Aug/2004	13:45			6.95																
CS21	10/Aug/2004	9:45		4.29	7.23																
D02	28/Aug/2004	15:05	1.76	14.35	4.26																
FT05	16/Aug/2004	15:00		1.87	2.68						1.28										
FT08	17/Aug/2004	8:00	1.5	2.58	2.04																
FT14	16/Aug/2004	9:00																			
FT15	16/Aug/2004	10:40		2.95	8.24																
NS07	12/Aug/2004	11:30			2.01																
NSJ18	12/Aug/2004	9:40	3.06	43.23	10.8																
NSJ24	18/Aug/2004	12:40			1.55																
NSJ26	18/Aug/2004	11:40			6.17																
SED03	30/Aug/2004	13:15			2.31																
SED07	27/Aug/2004	18:30		2.12	3.17																
SED08	28/Aug/2004	10:05	1.18	4.32	2.61																
SED09	28/Aug/2004	11:10		2.34	9.48		1.11														
SED10	28/Aug/2004	12:00	1.47	7.74	19.02						1.22										
SED11	28/Aug/2004	14:00	2.32	2.66	3.4																
SED12	27/Aug/2004	16:30	9.8	56.36	28.53	2.52			1.24					1.2							
SS03	19/Aug/2004	13:30	1.43	12.9	11.09																
SS04	10/Aug/2004	13:55																			
SS07	19/Aug/2004	12:00																			
SSJ01	17/Aug/2004	9:30			4.37																
SSJ04	27/Aug/2004	12:25		3.56	8.95						1.36										
SSJ05	27/Aug/2005	9:50		3.7	2.23																
SSJ08	12/Aug/2004	14:30		1.7	4.87																
SSJ09	27/Aug/2004	11:40		1.57	4.5																
SSJ12	27/Aug/2004	14:00		1.32	1.52																
Maximum			9.8	56.36	28.53	2.52	1.11	0	1.24	0	1.36	0	1.21	1.2	0	0	0	0	0	1.95	0
Minimum			1.18	1.32	1.44	2.52	1.11	0	1.24	0	1.22	0	1.21	1.2	0	0	0	0	0	1.95	
Median			1.5	2.99	4.31	2.52	1.11	0	1.24	0	1.28	0	1.21	1.2	0	0	0	0	0	1.95	0
90th Percentile			4.41	14.35	10.83	2.52	1.11	0	1.24	0	1.34	0	1.21	1.2	0	0	0	0	0	1.95	0
# of Samples			33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
Frequency%			27.27	63.64	90.91	3.03	3.03	0	3.03	0	9.09	0	3.03	3.03	0	0	0	0	0	3.03	0

Table 15. Summary of Organophosphate Pesticides detected during the Irrigation 2004 season ((µg/Kg)

SiteID	Date	Time	Chlorpyrifos
CS02	30/Aug/2004	11:00	4.45
CS03	09/Aug/2004	9:40	
CS09	10/Aug/2004	11:30	
CS10	10/Aug/2004	12:55	3.21
CS12	09/Aug/2004	11:25	2.53
CS13	30/Aug/2004	15:30	
CS15	09/Aug/2004	13:45	1.89
CS21	10/Aug/2004	9:45	
D02	28/Aug/2004	15:05	1.51
FT05	16/Aug/2004	15:00	39.66
FT08	17/Aug/2004	8:00	
FT14	16/Aug/2004	9:00	
FT15	16/Aug/2004	10:40	
NS07	12/Aug/2004	11:30	
NSJ18	12/Aug/2004	9:40	1.41
NSJ24	18/Aug/2004	12:40	
NSJ26	18/Aug/2004	11:40	
SED03	30/Aug/2004	13:15	
SED07	27/Aug/2004	18:30	1.71
SED08	28/Aug/2004	10:05	1.82
SED09	28/Aug/2004	11:10	4.51
SED10	28/Aug/2004	12:00	2.58
SED11	28/Aug/2004	14:00	3.85
SED12	27/Aug/2004	16:30	1.34
SS03	19/Aug/2004	13:30	
SS04	10/Aug/2004	13:55	
SS07	19/Aug/2004	12:00	
SSJ01	17/Aug/2004	9:30	
SSJ04	27/Aug/2004	12:25	2.28
SSJ05	27/Aug/2005	9:50	4.34
SSJ08	12/Aug/2004	14:30	1.42
SSJ09	27/Aug/2004	11:40	
SSJ12	27/Aug/2004	14:00	2.61
Maximum			39.66
Minimum			1.34
Median			2.53
90th Percentile			4.47
# of Samples			33
Frequency%			51.52

Table 16. Summary of Pyrethroids detected during the Irrigation 2004 Season (µg/Kg)

SiteID	Date	Time	Bifenthrin	Cyfluthrin, total	Cyhalothrin, lambda, total	Cypermethrin, total	Deltamethrin	Esfenvalerate/Fenvalerate, total	Permethrin-1	Permethrin-2
CS02	30/Aug/2004	11:00							1.39	2.34
CS03	09/Aug/2004	9:40						1		1.65
CS09	10/Aug/2004	11:30			1.16			1.42		
CS10	10/Aug/2004	12:55								
CS12	09/Aug/2004	11:25			2.03				2.31	1.78
CS13	30/Aug/2004	15:30	2.12					1.03		
CS15	09/Aug/2004	13:45								
CS21	10/Aug/2004	9:45							1.87	0.94
D02	28/Aug/2004	15:05	1.7		1.51			2.05	4.88	1.51
FT05	16/Aug/2004	15:00							1.16	
FT08	17/Aug/2004	8:00					2.03	1.1		
FT14	16/Aug/2004	9:00	6.55							
FT15	16/Aug/2004	10:40							1.24	2.41
NS07	12/Aug/2004	11:30			1.1					
NSJ18	12/Aug/2004	9:40	1.24		12.82					
NSJ24	18/Aug/2004	12:40								
NSJ26	18/Aug/2004	11:40								
SED03	30/Aug/2004	13:15							4.3	1.11
SED07	27/Aug/2004	18:30								
SED08	28/Aug/2004	10:05						1.17		
SED09	28/Aug/2004	11:10	4.24						2.77	2.02
SED10	28/Aug/2004	12:00	2.17		1.45		1.93			
SED11	28/Aug/2004	14:00			1.79			52.69		
SED12	27/Aug/2004	16:30			7.99					
SS03	19/Aug/2004	13:30								
SS04	10/Aug/2004	13:55								
SS07	19/Aug/2004	12:00								
SSJ01	17/Aug/2004	9:30								
SSJ04	27/Aug/2004	12:25								
SSJ05	27/Aug/2005	9:50								
SSJ08	12/Aug/2004	14:30								
SSJ09	27/Aug/2004	11:40								
SSJ12	27/Aug/2004	14:00								1.73
Maximum			6.55	0	12.82	0	2.03	52.69	4.88	2.41
Minimum			1.24	0	1.10	0	1.93	1.00	1.16	0.94
Median			2.15	0	1.65	0	1.98	1.17	2.09	1.73
90th Percentile			5.40	0	9.44	0	2.02	22.31	4.47	2.35
# of Samples			33	33	33	33	33	33	33	33
Frequency%			18.18	0	24.24	0	6.06	21.21	24.24	27.27

Table 17. Summary of Toxicity data for Dormant 2005 and Irrigation 2005

Site ID	Date	Time	Hyallella azteca (% survival) (**indicates significantly different to control group)
SED15	24/Mar/2005	12:40	**8.75****
SED16	24/Mar/2005	14:15	96.25
SED17	24/Mar/2005	15:55	96.25
SED18	24/Mar/2005	17:30	**42.5****
FT03	24/Mar/2005	18:00	88.75
SED25	25/Mar/2005	17:50	**26.25****
SED26	25/Mar/2005	18:00	88.75
SED19	25/Mar/2005	9:00	88.75
SED20	25/Mar/2005	9:35	**8.75****
SED21	25/Mar/2005	10:50	93.75
SED22	25/Mar/2005	12:05	78.75
SED23	25/Mar/2005	12:45	**42.5****
SED24	25/Mar/2005	16:10	91.25
FT05	25/Mar/2005	8:45	77.5
NSJ28	12/Apr/2005	8:30	87.5
NSJ32	12/Apr/2005	9:10	98.57
SSJ12	12/Apr/2005	9:10	93.75
NSJ18	12/Apr/2005	12:35	95
SED11	12/Apr/2005	10:40	90
SSJ03	12/Apr/2005	10:45	96.25
SED27	13/Apr/2005	9:00	96.25
SED29	13/Apr/2005	10:20	87.5
SED30	13/Apr/2005	9:30	95.71
SS06	13/Apr/2005	14:40	77.5
SED28	13/Apr/2005	12:30	91.25
CS07	13/Apr/2005	11:30	92.5
CS15	13/Apr/2005	13:30	95.71
CS11	09/Aug/2005	12:00	93.75
SS05	09/Aug/2005	12:40	98.75
SS09	09/Aug/2005	13:10	93.75
CS06	09/Aug/2005	9:30	**78.75****
CS12	09/Aug/2005	8:20	**1.25****
CS15	09/Aug/2005	7:10	**3.75****
SLO	09/Aug/2005	10:50	95
SSI	10/Aug/2005	11:50	**92.5****
NSJ28	10/Aug/2005	7:10	95
NSJ31	10/Aug/2005	8:30	**81.25****
NSJ32	10/Aug/2005	7:50	96.25
SJC516	10/Aug/2005	9:50	95
SJC517	10/Aug/2005	9:20	95
SED15	18/Aug/2005	13:50	**0****
SED17	18/Aug/2005	16:22	93.75
SED18	18/Aug/2005	17:20	100
FT03	18/Aug/2005	17:58	**69****
FT24	18/Aug/2005	15:28	93.75
SED19	19/Aug/2005	8:45	**69****
SED20	19/Aug/2005	9:55	89
SED22	19/Aug/2005	17:10	96.25
SED23	19/Aug/2005	16:45	100
SED24	19/Aug/2005	17:55	**12.5****
FT05	19/Aug/2005	9:05	97.5
FT18	19/Aug/2005	11:45	85
FT31	19/Aug/2005	14:30	97.5
FT19	19/Aug/2005	10:55	**0****
FT25	19/Aug/2005	15:25	91.25
SSJ10	20/Aug/2005	12:40	95
SED25	20/Aug/2005	10:40	**0****
SED26	20/Aug/2005	11:05	**12.5****
SSJ04	20/Aug/2005	9:50	**17.5****
SSJ07	20/Aug/2005	13:40	**27.5****
SSJ03	20/Aug/2005	9:08	110

NA: Less than 3 of 8 replicates survived; significance not applicable to sample

Table 18. Summary of Organocholorine QA/QC data for the Irrigation 2004 Season

SiteID	Date	Time	Aldrin	Chlordane, Alpha-	Chlordane, gamma-	DDD(p,p')	DDE(p,p')	DDT(p,p')	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Endrin Aldehyde	Endrin Ketone	HCH, alpha	HCH, beta	HCH, delta	HCH, gamma	Heptachlor	Heptachlor epoxide	Methoxychlor
FIELD DUPLICATES																						
SED09	28/Aug/2004	11:10					2.34	9.48														1.11
SED09	28/Aug/2004	11:10					3.43	11.03	2.12													ND
RPD			NA	NA	NA	NA	37.8	15.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SSJ12	27/Aug/2004	14:00					1.32	1.52														
SSJ12	27/Aug/2004	14:00					1.8	6.02														
RPD			NA	NA	NA	NA	30.8	119	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
NSJ18	12/Aug/2004	9:40				3.06	43.23	10.8	1.58													
NSJ18	12/Aug/2004	9:40				1.84	36.49	12.62	2.17													
RPD			NA	NA	NA	49.8	17	15.5	31.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MATRIX SPIKES																						
SSJ01	17/Aug/2004	9:30	3.89	3.99	4	3.62	4.04	7.1	4.37	4.32	3.88	4.48	4.57	3.71	4.48	4.21	4.11	4.21	4.01	4.53	4.05	5.64
PR			79.39	81.43	81.63	73.88	82.45	144.9	89.18	88.16	79.18	91.43	93.27	75.71	91.43	85.92	83.88	85.92	81.84	92.45	82.65	115.1
SED03	30/Aug/2004	13:15	4.59	4.2	4.75	4.02	4.25	8.39	4.59	4.76	4.1	4.95	5.07	4.1	4.47	4.9	4.95	5.33	5.05	5.38	4.36	6.01
PR			85	77.78	87.96	77.44	78.7	155.37	85	88.15	75.93	91.67	93.89	75.93	82.78	90.74	91.67	98.7	93.52	99.63	80.74	111.3

Table 19. Suumary of OP QA/QC Data

SiteID	Date	Time	Chlorpyrifos
FIELD DUPLICATES			
SED09	28/Aug/2004	11:10	4.51
SED09	28/Aug/2004	11:10	4.94
RPD			9.1
SSJ12	27/Aug/2004	14:00	2.61
SSJ12	27/Aug/2004	14:00	2.56
RPD			1.9
NSJ18	12/Aug/2004	9:40	1.41
NSJ18	12/Aug/2004	9:40	2.28
RPD			47.2
MATRIX SPIKES			
SSJ01	17/Aug/2004	9:30	4.65
PR			94.9
SED03	30/Aug/2004	13:15	5.27
PR			97.59

Table 20. Summary of Pyrethroid QA/QC data for the Irrigation 2004 Season

SiteID	Date	Time	SampleTypeCode	Bifenthrin	Cyfluthrin, total	Cyhalothrin, lambda, total	Cypermethrin, total	Deltamethrin	Esfenvalerate/Fenvalerate, total	Permethrin-1	Permethrin-2
FIELD DUPLICATES											
SED09	28/Aug/2004	11:10	Integrated	4.24						2.77	2.02
SED09	28/Aug/2004	11:10	FieldDup	4.45		1.51					
RPD				4.8	NA	NA	NA	NA	NA	NA	NA
SSJ12	27/Aug/2004	14:00	Integrated								1.73
SSJ12	27/Aug/2004	14:00	FieldDup			1.94				2.83	1.74
RPD				NA	NA	NA	NA	NA	NA	NA	0.6
NSJ18	12/Aug/2004	9:40	Integrated	1.24		12.82					
NSJ18	12/Aug/2004	9:40	Integrated			8.98					
RPD				NA	NA	35.3	NA	NA	NA	NA	NA
MATRIX SPIKES											
SSJ01	17/Aug/2004	9:30	MS	4.72	4.78	4.99	4.73	4.67	5.03	3.12	2.54
PR				96.33	97.55	101.84	96.53	95.31	102.65	63.67	51.84
SED03	30/Aug/2004	13:15	MS	5.49	6.09	5.43	4.54	5.23	5.87	3.02	2.36
PR				101.67	112.78	100.65	84.07	96.85	108.7	55.93	43.7

Table 21. Summary of the Toxicity QA/QC data for the Dormant 2005 and Irrigation 2005 seasons

Site ID	Date	Time	Sample	Selenastrum capricornutum (Y indicates significantly different growth to control group)	Hyallella azteca (% survival) (**indicates significantly different to control group)
SLO	09/Aug/2005	10:50	Environmental	N	95
SLO	09/Aug/2005	10:53	Duplicate	N	96.25
SED19	25/Mar/2005	9:00	Environmental	N	88.75
SED19	25/Mar/2005	9:00	Duplicate	NA	88.75
SED18	18/Aug/2005	17:20	Environmental	N	100
SED18	18/Aug/2005	17:20	Duplicate	N	95

NA: Less than 3 of 8 replicates survived; significance not applicable to sample